LOEWE.

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Hinweis zum Schutz gegen Elektrostatik

1. **Elektrostatisch gesicherte MOS-Arbeitsplätze.**

   Der Umgang mit gegen Elektrostatik empfindlichen Bauteilen muß an einem elektrostatisch gesicherten MOS-Arbeitsplatz erfolgen.
   Ein elektrostatisch gesicherter MOS-Arbeitsplatz erdet über Entladungswiderstände sämtliche leitende Materialien einschließlich der Person. Nichtleiter werden durch Luftionisation entladen. Die Integration von Lötkolben und Meßgeräten in den gesicherten MOS-Arbeitsplatz ist nur mit Trenntrafo in jedem der verwendeten Geräte möglich. Die Meßgeräte-Massen werden ebenfalls mit Entladungswiderständen geerdet.

2. **Gesicherte Verpackung durch leitfähige Materialien.**

   Zum Schutz gegen Elektrostatik werden elektrisch leitende Kunststoffe für Verpackung und Transportmittel verwendet. Leitende Kunststoffe gibt es als schwarze oder transparente Schutzbeutel, Schaumstoff, Folien und als Behälter.
   Empfindliche Bauteile dürfen nur am gesicherten MOS-Arbeitsplatz aus der Verpackung entfernt bzw. verpackt werden.

Sicherheitshinweise/Vorschriften

1. Instandsetzungen, Änderungen und Prüfung netzbetriebener elektronischer Geräte und deren Zubehör dürfen nur von fachkundigen Personen ausgeführt werden.
2. Es gelten die Vorschriften und Sicherheitshinweise nach VDE 0701, Teil 200, und die Vorschriften und Sicherheitshinweise des jeweiligen Landes!
3. VDE 0701, Teil 200, beinhaltet Vorschriften zur Instandsetzung, Änderung und Prüfung netzbetriebener elektronischer Geräte und deren Zubehör.
4. Vor der Auslieferung des Geräts muß eine Sichtprüfung des Geräts und der Anschlußleitungen (und soweit vorhanden, des Schutzleiters), und die Messung des Isolationswiderstandes und des Ersatz-Ableitstromes nach VDE 0701, Teil 200, durchgeführt werden. Der niederohmige Durchgang des Schutzleiters ist durch Messung laut Vorschrift VDE 0701, Teil 1, nachzuweisen.
5. Die Vorschriften des jeweiligen Landes sind zusätzlich zu beachten.
6. Bauteile mit dem Symbol ⚠ gekennzeichnet, dürfen nur durch Originalteile ersetzt werden.

Demontage der Rückwand

Zum Abnehmen der Rückwand werden die fünf Rückwandschrauben **R** herausgedreht. Schraubenzieher in die Aussparung **V** einführen. Verriegelung nach unten drücken und gleichzeitig Rückwand nach hinten schieben (Abb. 1).

Gerätechassis in Reparaturstellung bringen

1. Das Chassis hinten leicht anheben und vorsichtig nach hinten aus dem Gerät herausziehen (Abb. 2).
2. Lösen Sie die Kabelfixsierungen. Drehen Sie jetzt das Chassis um 90° entgegen dem Uhrzeiger und stellen Sie das Chassis hinter dem Gerät ab (Abb. 3).
3. Nach erfolgter Reparatur/Einstellung müssen die Leitungen wieder in ihre ursprüngliche Lage gebracht und fixiert werden.

Reparaturstellung für die Leiterplatte Signal-Board

1. Die Leiterplatte Signal-Board vom Hauptchassis (Basic-Board) abnehmen; vorher müssen alle Anschlußkabel abgezogen werden.
2. Die vier Schrauben (A) (Abb. 4) aus der AV-Abdeckung aus Kunststoff herausschrauben und die AV-Abdeckung durch Ausclipsen von der Leiterplatte Signal-Board abnehmen.
3. Die vordere Metallabdeckung von der Leiterplatte Signal-Board abnehmen (Abb. 5). Den gleichen Vorgang bei der hinteren Metallabdeckung wiederholen (Abb. 6).
4. Die drei Verlängerungskabel an die Leiterplatte Signal-Board anschließen; darauf achten, daß die Leiterplatte Signal-Board die Leiterplatte Basic-Board nicht berührt (Abb. 7).
5. Nach erfolgter Reparatur/Einstellung müssen sämtliche Kabel wieder in ihre ursprüngliche Lage gebracht und fixiert werden.

Hinweis:
Die Verlängerungskabel werden als Reparatur-Teilesatz unter der Bestell-Nr. 291-90274.920 geliefert.

☞ Reparaturhinweis Signal - Board MediaPlus

Bei Fehlern auf dem Signal-Board gehen Sie bitte folgendermaßen vor:

- Nehmen Sie den EAROM (I 1891) aus der Leiterplatte heraus. Das Gerät ist weiterhin spielfähig.
- Bekommen Sie jetzt ein stehendes Bild, ist der EAROM defekt, (etwaige Geometriefehler bleiben dabei unberücksichtigt).
- Ist der Fehler weiterhin vorhanden, liegt das an einem anderen Bauteil auf dem Signal-Board.
- wenn Sie das Signal-Board bei der Kundendienst-Zentrale Kronach tauschen wollen, setzen Sie den EAROM aus dem defekten Signal-Board in das neue ein. So ersparen sie sich den Geräteabgleich und die Programmierung.

Wichtig!
Am defekten Signal-Board entfernen Sie bitte die AV-Abdeckung.

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Note on electrostatic shielding

1. **Electrostatically shielded MOS workstations**

   Components sensitive to electrostatic discharge must be handled at workstation with electrostatic shielding. An electrostatically shielded MOS workstation is fitted with discharge resistor which earth all conductive materials, including the technician working there. Dielectrics are discharged by air ionisation. The use of soldering irons and measuring equipment at shielded workstation is only possible in conjunction with isolating transformer in each of the devices used. Measuring equipment chassis are also earthed with discharge resistors.

2. **Shielded packaging using conductive materials**

   To protect against electrostatic charges, electrically conductive plastics are used for packaging and transport purposes. Conductive plastics are available in the form of transparent protective bags, foam plastic, film sheeting or containers. Sensitive components requiring the use of protective packaging must only be packed and unpacked at shielded workstations.

Safety warnings/regulations

1. The repair, modification and testing of mains-operated electronic devices and their accessories must only be performed by qualified persons.
2. It is necessary to follow the regulations and safety warnings to VDE 0701, part 200, as well as the regulations and safety warnings applicable in the country concerned.
3. VDE 0701, Part 2, contains regulations on the repair, modification and testing of mains-operated electronic devices and their accessories.
4. Before delivery, the device and the connecting leads (including any protective earth conductor fitted) must undergo visual inspection, and the insulation resistance and the equivalent leakage current must be measured according to VDE 0701, part 200. The low-resistance continuity of the protective earth conductor must be verified by measurement to VDE regulation 0701, part 1.
5. The regulations of the country concerned must also be observed.
6. Only genuine parts must be used for replacing components marked with the symbol ⚠ .

Rear panel removal

Unscrew the five rear panel screws **R** to remove the rear panel. Insert screw driver into recess **V**. Depress interlocking and at the same time slide rear panel to the rear (fig. 1).

How to move the chassis into the service position

1. Hold and lift the rear of the chassis and gently pull the chassis toward you (fig. 2).
2. Undo the cable fixtures. Turn the chassis through 90°anti-clockwise and place the chassis behind the set (fig. 3).
3. After servicing ensure all wiring is returned to its original position and fixed.

Service position for the signal board

1. Remove the signal board from the main chassis (Basic board), ensuring all leads are disconnected.
2. Remove the four screws (A) (fig. 4) from the plastic AV cover and unclip the AV cover from the signal board.
3. Remove the front metal cover from the signal board (fig. 5). Do the same for the rear metal cover (fig. 6).
4. Fit the three extension leads to the signal board making sure that the signal board does not touch the basic board (fig. 7).
5. After servicing ensure all wiring is returned to its original position and fixed.

Note:
The extension lead wire kit is supplied as a service kit. (Part number 291-90274.920).

☞ Repair information for the signal board MediaPlus

There is any error on the signal board, please proceed as described:

- Remove the EAROM (I 1891) from the printed circuit board. The TV is able to keep running.
- If you get a static picture, the EAROM is out of order (possible geometry errors remain unconsidered).
- If the error is still there, it's because of another component on the signal board.
- If you want to change the signal board at the service head office in Kronach, insert the EAROM from the damaged signal board into the new one. So you don't need to make the alignment and the programming of the TV set.

Important!
Please remove the AV cover at the damaged signal board.

Recommandations pour la protection con tre les charges électrostatiques

1. **Postes de travail MOS protégés électrostatiquement**

   La manipulation de composants sensibles aux charges électrostatiques doit impérativement se faire a un poste de travail MOS protégé électrostatiquement. Un tel poste de travail MOS protégé électrostatiquement met tous les matéraux conducteurs à la masse par l'intermédiaire de résistances de décharge, y compris la personne qui y travaille. Les non-conducteurs sont déchargés par ionisation de l'air. L'intégration de fers 3 souder et d'appareils de mesure dans le poste de travail MOS protégé électrostatiquement n'est admissible que par l'intermédiaire de transformateurs de séparation intégrés à chacun des appareils. Les terres des appareils de mesure sont également mises 3 la masse par l'intermédiaire de résistance de décharge.

2. **Emballages de sécurité faits de matériaux conducteurs**

   Pou les protéger contre les charges électrostatiques, les composants sensibles sont emballes et transportes dans des matières plastiques conductrices d'électricité. Les matières plastiques conductrises existent en tant que sachets de protection noirs ou transparents, mousses, feuilles et aussi en tant que conteneurs. Les composants sensibles ne doivent être sortis de leu emballage conducteur ou y être emballes qu'au poste de travail MOS électrostatiquement protégé.

Consignes et prescriptions de sécurité

1. Les remises en état, modifications et examen d'appareils électroniques exploités sur réseau, et leurs accessoires, ne doivent être exécutés que par des professionnels.
2. On appliquera les prescriptions et consignes de sécurité selon VDE 0701, partie 200, et les prescriptions et consignes de sécurité du pays respectif!
3. VDE 0701, partie 200, comporte des prescriptions sur la remise en état, modification et examen d'appareils électroniques exploités sur réseau, et leurs accessoires.
4. Avant la livraison de l'appareil, il faut effectuer un examen visuel de l'appareil et câbles de branchement (et si existant de la terre), et la mesure de la résistance d'isolation et du courant de fuite de remplacement selon VDE 0701, partie 200. Le passage de basse impédance de la terre doit être démontré par une mesure conformément à la prescription VDE 0701, partie 1.
5. Les prescriptions du pays respectif doivent être également observées.
6. Les éléments caractérisés avec le symbole ⚠ ne doivent être remplacés que par des pièces originales.

Démontage du panneau arrière

Pour enlever la paroi arrière, dévissez les cinq vis **R**. Introduire un petit tournevis dans l'ouverture **V**. Pousser le verrouillage vers le bas et faire glisser en même temps le paroi arrière vers l'arrière (fig. 1).

Châssis d'appareil en position de réparation

1. Lever légèrement le châssis a l'arrière et le sortir avec précautions de l'appareil vers l'arrière (fig. 2).
2. Desserrer les serre-câble. Tourner le châssis à 90° dans le sens inverse des aiguilles d'une montre et placer le châssis derrière l'appareil (fig. 3).
3. Une fois la reparation/réglage effectuée, les câbles doivent être remis dans leur position initiale et fixes.

Réparation de la carte à circuits imprimes «Signaux»

1. Enlever la carte signaux du châssis principal (carte mère); auparavant, tous les câbles de raccordement doivent être débranchés.
2. Dévisser les quatre vis (A) (fig. 4) du recouvrement AV en plastique et retirer celui-ci de la carte signaux en ôtant les clips.
3. Enlever le recouvrement métallique frontal de la carte signaux (fig. 5). Procéder de la même manière pour le recouvrement métallique arrière (fig. 6).
4. Raccorder les trois câbles de rallonge à la carte signaux; ce faisant, veiller à ce que la carte signaux ne touche pas à la carte mère (fig. 7).
5. Une quatre la réparation/réglage effectuée, tous les câbles doivent être remis dans leur position initiale et fixes.

Remarque:
les câbles de rallonge sont fournis comme jeu de pièces de réparation sous le numéro de référence 291-90274.920.

☞ Note d'information pour la maintenance du circuit signal MediaPlus.

En cas de panne sur la platine signal veuillez procéder comme suit:

- Retirer l'EAROM (I 1891) de son support. L'appareil est toujours apte à fonctionner.
- Si vous obtenez une image statique, l'EAROM est défectueuse (erreurs possibles et inconsidérées de la géométrie d' image).
- Si la panne persiste, c'est qu'il s'agit d'un autre composant sur le module signal.
- Si vous voulez changer la platine signal auprès de votre fournisseur Loewe Kronach, conservez l'EAROM de la platine défectueuse afin de l'insérer dans la nouvelle platine. De ce fait, vous n'aurez pas besoin de réaligner et de reprogrammer le téléviseur.

Important!
Oter de la platine défectueuse que vous conserverez le couverture AV.

Nota per la protezione da scariche elettrostatiche

1. Posti di lavoro MOS protetti elettrostaticamente

La manipolazione di componenti sensibili alle scariche elettrostatiche deve essere eseguita a posti di lavoro MOS protetti da queste scariche. Un posto di lavoro MOS protetto dalle scariche elettrostatiche convoglia a terra tutti i materiali conduttori compresa la persona mediante resistenze di scarica. Gli isolatori vengono scaricati mediante ionizzazione dell'aria. L'integrazione di saldatoi e apparecchi di misura nel posto di lavoro MOS protetto é possibile solo attraverso trasformatori di separazione in ogni apparecchio usato. Anche le massa degli apparecchi di misura vengono scaricate a terra mediante resistente di scarica.

2. Imballaggio protetto mediante materiali conduttori

Per proteggere le componenti dalle scariche elettrostatiche vengono usati degli imballaggi e dei mezzi di trasporto di materiale sintetico conduttore. Esistono imballaggi di materiale sintetico conduttore sottoforma di sacchetti di protezione trasparenti o neri, materiale schiumoso, fogli e contenitori.
Componenti sensibili devono essere tolti, risp. messi negli imballaggi di materiale conduttore solo in un posto di lavoro MOS protetto.

Note per la sicurezza/disposizioni

1. Riparazioni, modifiche e controlli su apparecchiature elettroniche ed accessori collegati alla rete elettrica devono essere eseguiti esclusivamente da personale esperto.
2. Si applicano le disposizioni e le note per la sicurezza della norma VDE 0701, parte 200, e quelle del Paese di installazione.
3. VDE 0701, parte 200, riporta le disposizioni per le riparazioni, modifiche e controlli su apparecchiature elettroniche ed accessori collegati alla rete elettrica.
4. Prima della consegna, si deve effettuare un controllo visivo dell'apparecchio e dei cavi di collegamento (anche del conduttore di protezione, se presente) nonchè la misurazione della resistenza di isolamento e della corrente deviata sostitutiva secondo la norma VDE 0701, parte 200. La continuità a basso valore ohmico del conduttore di protezione va dimostrata secondo la norma VDE 0701, parte 1.
5. Si devono rispettare anche le disposizioni relative in vigore nel Paese di installazione.
6. Componenti contrassegnati con il simbolo ⚠ devono essere sostituiti solo con ricambi originali.

Smontaggio del pannello posteriore

Per togliere il pannello si svitano le cinque viti **R** del pannello posteriore. Introdurre la punta del cacciavite nelle fessure **V**. Spingere il bloccaggio verso il basso e contemporaneamente far scivolare il pannello posteriore indietro (fig. 1).

Come si porta il telaio in posizione di riparazione

1. Alzare leggermente il telaio sulla parte posteriore ed estrarlo cautamente dalla parte posteriore dell'apparecchio (fig. 2).
2. Allentare i fissaggi dei cavi. Girare il telaio di 90° verso sinistra e appoggiare il telaio dietro l'apparecchio (fig. 3).
3. Dopo la riparazione/regolazione riportare i cablaggi nella posizione originaria e fissarli.

Posizione di riparazione della piastra segnale

1. Staccare la piastra segnale dal telaio principale (piastra di base). Prima staccare tutti i cablaggi.
2. Togliere le quattro viti (A) (fig. 4) dal coperchio di plastica dell'AV e, premendo i clip, smontare il coperchio dell'AV dalla piastra segnale.
3. Togliere il coperchio di metallo anteriore dalla piastra segnale (fig. 5). Ripetere l'operazione per il coperchio di metallo posteriore (fig. 6).
4. Collegare i tre cavi di prolunga alla piastra segnale facendo attenzione che la piastra di base non tocchi la piastra segnale (fig. 7.
5. Dopo la riparazione/regolazione, riportare i cablaggi nella posizione originaria e fissarli.

NOTA:
cavi di prolunga sono forniti come set di riparazione con il N° di codice 291-90274.920.

☞ Nota di riparazione della piastra segnale MediaPlus

In caso di guasto della piastra segnale seguire le seguenti indicazioni:

- Estraete EAROM (I 1891) dal modulo. L'apparecchio è ancora funzionante.
- Se adesso, l'immagine è ferma l'EAROM è difettoso, (eventuali errori sulla geometria non sono da prendere in considerazione).
- Se il guasto si presenta ancora, esso è da ricercare su un altro componente della piastra segnale.
- In caso di permuta della piastra difettosa, tramite la Loewe Kronach, trattenete presso di voi l'EAROM, onde evitare la perdita dei dati memorizzati.

Importante:
Trattenete dal modulo difettoso coperchio AV.

Advertencia para la protección contra cargas electrostáticas

1. **Protección contra cargas electrostáticas en puestos de manipulación de módulos MOS**

   La manipulación de piezas sensibles contra cargas electrostáticas debe realizarse en puestos de manipulación de módulos MOS protegidos contra dichas cargas. Para que un puesto de manipulación de módulos MOS esté protegido contra descargas electrostáticas, todos los materiales conductores, incluído el operario, deben conectarse a tierra mediante resistencias de descarga. Los elementos no conductores deben descargarse mediante un ionizador de aire. La integración de soldadores y aparatos de medición en los puestos de manipulación de módulos MOS sólo se puede realizar con transformadores separadores en cada aparato utilizado. También deben conectarse a tierra las masas de los aparatos de medición utilizando resistencias de descarga.

2. **Embalaje protegido con materiales conductores**

   Para la protección contra las cargas electrostáticas se utilizan materiales sintéticos conductores para el embalaje y el transporte. Los materiales sintéticos conductores están disponibles en forma de bolsas protectoras negras o transparentes, gomaespuma, películas y envases.
   Las piezas electrostáticamente sensibles deben embalarse y/o desembalarse solamente en puestos de manipulación de módulos MOS.

Advertencias y normas de seguridad

1. Las puestas a punto, cambios y revisiones de aparatos electrónicos alimentados por la red y sus accesorios, sólo deben realizarse por personas especializadas.
2. Son aplicables las advertencias y normas de seguridad detalladas en la norma VDE 0701, apartado 200 y las correspondientes de cada país.
3. El apartado 200 de la norma VDE 0701 describe las puestas a punto, cambios y revisiones de aparatos electrónicos alimentados por la red y sus accesorios.
4. Antes de efectuar el suministro del aparato debe realizarse una comprobación visual del mismo y de las líneas de conexión (y, en su caso, de la línea protectora), así como una medición de la resistencia de aislamiento y de la corriente sustitutiva de escape según VDE 0701, apartado 200. Debe verificarse la baja resistencia de la línea protectora recogida en la norma VDE 0701, apartado 1.
5. Se han de tener en cuenta además las normas de los países correspondientes.
6. Las piezas marcadas con el símbolo ⚠ sólo podrán reemplazarse por piezas originales.

Medición de alta tensión

1. Ajustar el brillo al mínimo.
2. Medir la alta tensión. El aparato debe marcar 29,0 kV ± 0,7 kV. En caso de excederse el límite de tolerancia, debe corregirse inmediatamente para prevenir el fallo prematuro de los componentes.
3. Para limitar las posibles radiaciones de rayos X, es importante utilizar exclusivamente el tubo de imagen recomendado.

Advertencia: Es importante utilizar un voltímetro preciso y revisado periódicamente.

Desmontaje del panel posterior

Para retirar el panel posterior deben extraerse los cinco tornillos **R** que lo fijan al aparato. El destornillador debe introducirse en la ranura **V**. Empujar el cierre hacia abajo, deslizando al mismo tiempo el panel posterior hacia atrás (Figura 1).

Colocación del chasis del aparato en posición de reparación

1. Levantar ligeramente el chasis por la parte trasera y tirar con cuidado hacia atrás para extraerlo del aparato (Figura 2).
2. Liberar las sujeciones de los cables. Girar el chasis 90° en sentido contrario al de las agujas del reloj y dejarlo detrás del aparato (Figura 3).
3. Una vez finalizada la reparación o puesta a punto, colocar y fijar los cables en su posición original.

Posición de reparación del circuito impreso de la tarjeta de señales

1. Extraer la tarjeta de señales del chasis principal (tarjeta básica); antes han de retirarse todos los cables de conexión.
2. Extraer los cuatro tornillos (A) (Figura 4) de la cubierta plástica de AV y retirar ésta desencajándola de la tarjeta de señales.
3. Retirar la cubierta metálica delantero de la tarjeta de señales (Figura 5). Repetir el proceso con la cubierta metálica posterior (Figura 6).
4. Conectar los tres cables alargadores a la tarjeta de señales; tener cuidado de que la tarjeta de señales no entre en contacto con el circuito impreso de la tarjeta básica (Figura 7).
5. Una vez finalizada la reparación o puesta a punto, colocar y fijar los cables en su posición original.

Nota:
Los cables alargadores se pueden encargar como juego de piezas de recambio indicando el número de pedido 291-90274.920.

Notas para la reparación de la tarjeta de señales MediaPlus

En caso de avería, rogamos dar los siguientes pasos:

- Extraer la EAROM (I 1891) de la placa de circuito impreso. Esto no impide que el aparato siga funcionando.
- Si aparece una imagen fija, significa que la EAROM está defectuosa (no se consideran los posibles fallos en la geometría de la imagen).
- Si el fallo persiste, la avería se encuentra en otro componente de la tarjeta de señales.
- Para cambiar la tarjeta de señales en nuestro Centro de Atención al Cliente en Kronach, instalar la EAROM de la tarjeta de señales defectuosa en la tarjeta nueva. Así se ahorra la comprobación y programación del aparato.

Importante!
Retirar los de la tarjeta de señales la cubierta de AV.

Aanwijzing ter bescherming tegen elektrostatica

1. Elektrostatisch beveiligde MOS-werkplekken.

De omgang met voor elektrostatica gevoelige componenten moet op een elektrostatisch beveiligde MOS-werkplek plaatsvinden.
Bij een elektrostatisch beveiligde MOS-werkplek worden alle geleidende materialen en de persoon zelf via ontladingsweerstanden geaard. Niet-geleiders worden door luchtionisatie ontladen. De integratie van soldeerbouten en meetapparaten in de beveiligde MOS-werkplek is alleen met een scheidingstransformator in elk van de gebruikte apparaten mogelijk. De massa's van de meetapparaten worden eveneens met ontladingsweerstanden geaard.

2. Veilige verpakking door geleidende materialen.

Ter bescherming tegen elektrostatica worden elektrisch geleidende kunststoffen voor de verpakking en de transportmiddelen gebruikt. Geleidende kunststoffen zijn als zwarte of transparante beschermzakjes, schuimstof, folie en als container verkrijgbaar.
Gevoelige componenten mogen alleen op de beveiligde MOS-werkplek uit de verpakking worden gehaald resp.worden verpakt.

Veiligheidsinstructies/voorschriften

1. Elektronische apparaten met netvoeding en hun toebehoren mogen uitsluitend door vakkundige personen worden gerepareerd, gewijzigd en gecontroleerd.
2. De voorschriften en veiligheidsinstructies volgens VDE 0701, deel 200, en de voorschriften en veiligheidsinstructies van het desbetreffende land zijn van kracht!
3. VDE 0701, deel 200, bevat de voorschriften voor de reparatie, de wijziging en de controle van elektronische apparaten met netvoeding en hun toebehoren.
4. Voordat het toestel wordt afgeleverd, moeten het toestel en de aansluitleidingen (en voor zover aanwezig, de aarddraad) aan een visuele controle worden onderworpen en de isolatieweerstand en de reserve-lekstroom conform VDE 0701, deel 200, worden gemeten. De laagohmige doorgang van de aarddraad moet door meting volgens voorschrift VDE 0701, deel 1, worden aangetoond.
5. Tevens dienen de voorschriften van het desbetreffende land in acht te worden genomen.
6. Componenten die gekenmerkt zijn met het symbool ⚠ , mogen uitsluitend door originele reserveonderdelen worden vervangen.

Demontage van de achterwand

Om de achterwand te verwijderen, moeten de vijf schroeven **R** uit de achterwand worden gedraaid. Steek de schroevendraaier in de uitsparing **V**. Druk de vergrendeling naar beneden en schuif tegelijkertijd de achterwand naar achteren (afb. 1).

Chassis van het toestel in de reparatiestand zetten

1. Til het chassis aan de achterkant iets op en schuif het voorzichtig naar achteren uit het toestel (afb. 2).
2. Maak de kabelbevestigingen los. Draai het chassis nu 90° tegen de klok in en zet het chassis achter het toestel neer (afb. 3).
3. Na de reparatie/instelling moeten de kabels weer op de oorspronkelijke positie worden aangebracht en bevestigd.

Reparatiestand voor printplaat Signal-Board

1. Verwijder de printplaat Signal-Board van het hoofdchassis (Basic-Board); eerst moeten alle aansluitkabels worden losgetrokken.
2. Draai de vier schroeven (A) (afb. 4) uit de kunststof-AV-afdekking en wip de AV-afdekking van de printplaat Signal-Board.
3. Verwijder de metalen afdekking van de printplaat Signal-Board (afb. 5). Doe hetzelfde bij de achterste metalen afdekking (afb. 6).
4. Sluit de drie verlengkabels op de printplaat Signal-Board aan; let erop, dat de printplaat Signal-Board de printplaat Basic-Board niet raakt (afb. 7).
5. Na de reparatie/instelling moeten alle kabels weer op de oorspronkelijke positie worden aangebracht en bevestigd.

Aanwijzing:
De verlengkabels zijn als reparatie-onderdeel onder bestelnummer 291-90274.920 verkrijgbaar.

Reparatie-instructie Signal - Board MediaPlus

Bij fouten op de Signal-Board gaat u als volgt te werk:

- Verwijder de EAROM (I 1891) uit de printplaat. Het toestel isnog steeds functioneel.
- Als nu een stilstaand beeld ontstaat, is de EAROM defect, (met eventuele geometriefouten wordt hierbij geen rekening gehouden).
- Als de fout blijft bestaan, ligt dat aan een andere component op de Signal-Board.
- Als u de Signal-Board bij de service-centrale Kronach wilt vervangen, plaatst u de EAROM van de defecte Signal-Board in de nieuwe. Op die manier hoeft u het toestel niet opnieuw af te stemmen en te programmeren.

Balangrijk!
Verwijder bij een defect Signal-Board de AV-afdekking.

Demontage der Rückwand
Gerätechassis in Reparaturstellung bringen

Rear panel removal
How to move the chassis into the service position

Démontage du panneau arrière
Come si porta il telaio in posizione di riparazione

Smontaggio del pannello posteriore
Châssis d'appareil en position de réparation

Desmontaje del panel posterior
Colocación del chasis del aparato en posición de reparación

Demontage van de achterwant
Chassis van het toestel in de reparatiestand zetten

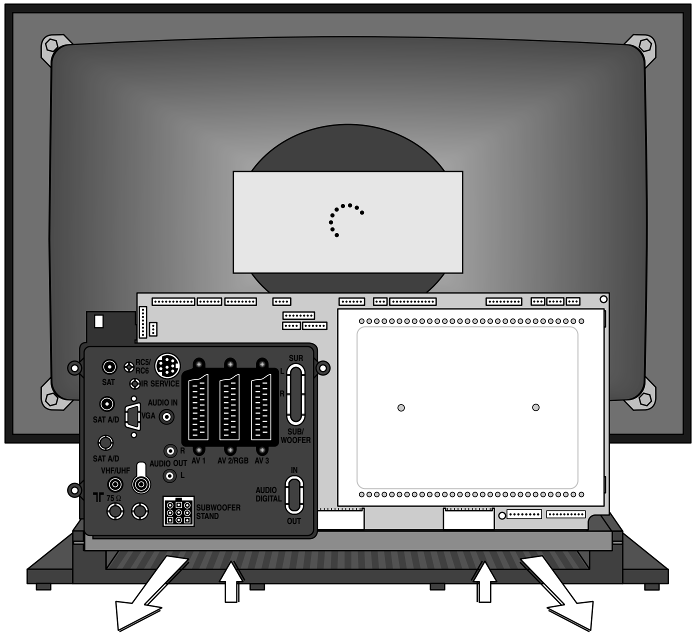

RC5/RC6
SAT
IR SERVICE
AUDIO IN
VGA
SAT A/D
VHF/UHF
75 Ω
AUDIO OUT
AV 1
AV 2/RGB
AV 3
SUR
SUB/WOOFER
IN
AUDIO DIGITAL
OUT
SUBWOOFER STAND

Abb.2
Fig.2
Afb. 2

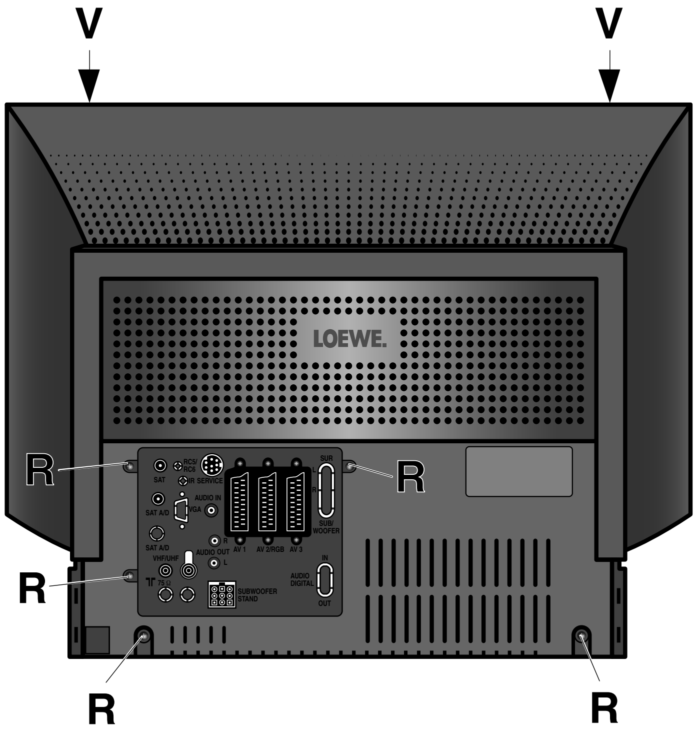

V
V
LOEWE.
R
R
R
R
R
RC5/RC6
SAT
IR SERVICE
AUDIO IN
VGA
SAT A/D
VHF/UHF
AUDIO OUT
AV 1
AV 2/RGB
AV 3
SUR
SUB/WOOFER
IN
AUDIO DIGITAL
OUT
SUBWOOFER STAND

Abb.1
Fig.1
Afb. 1

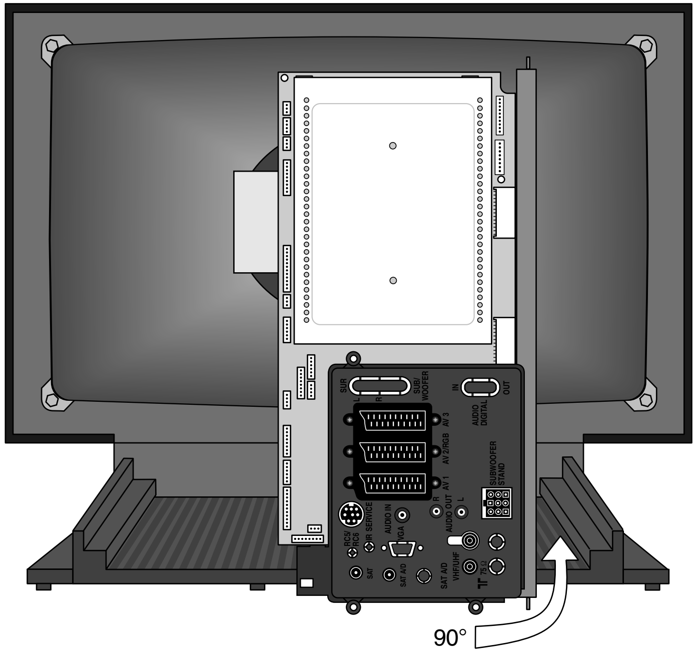

SUR
SUB/WOOFER
IN
AUDIO DIGITAL
OUT
AV 3
AV 2/RGB
AV 1
SUBWOOFER STAND
AUDIO OUT
AUDIO IN
VGA
IR SERVICE
RC5/RC6
SAT
SAT A/D
VHF/UHF
75 Ω
90°

Abb.3
Fig.3
Afb. 3

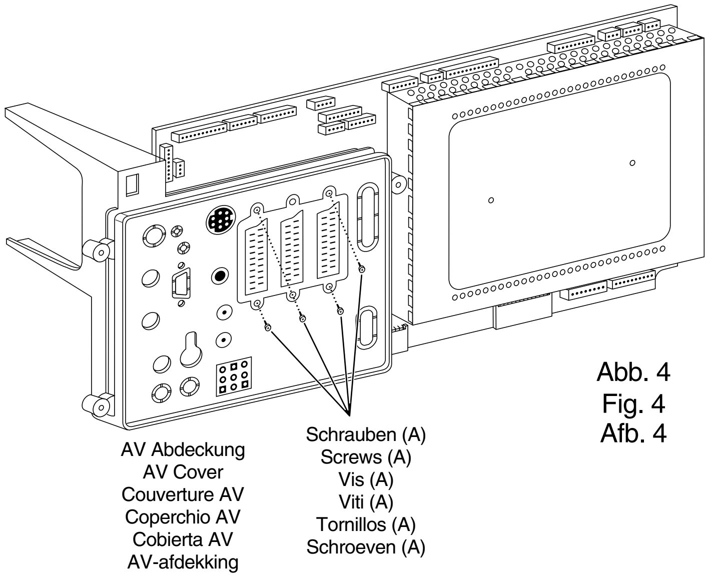
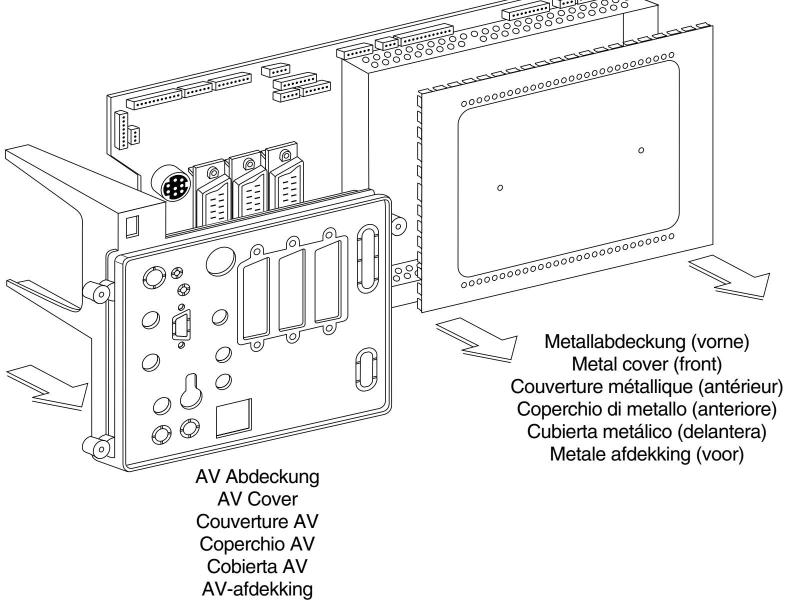

AV Abdeckung
AV Cover
Couverture AV
Coperchio AV
Cobierta AV
AV-afdekking
Schrauben (A)
Screws (A)
Vis (A)
Viti (A)
Tornillos (A)
Schroeven (A)

Abb. 4
Fig. 4
Afb. 4

Abb. 5
Fig. 5
Afb. 5


Metallabdeckung (vorne)
Metal cover (front)
Couverture métallique (antérieur)
Coperchio di metallo (anteriore)
Cubierta metálico (delantera)
Metale afdekking (voor)
AV Abdeckung
AV Cover
Couverture AV
Coperchio AV
Cobierta AV
AV-afdekking

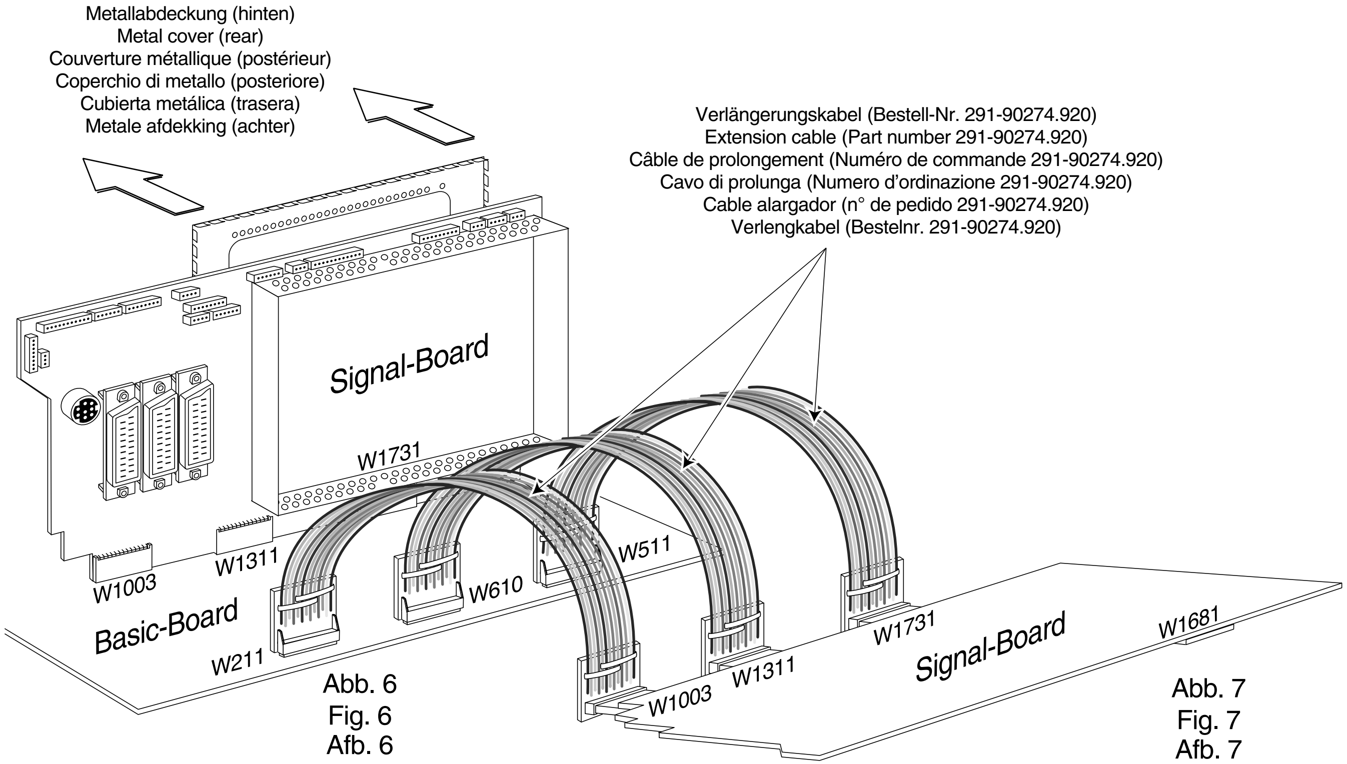
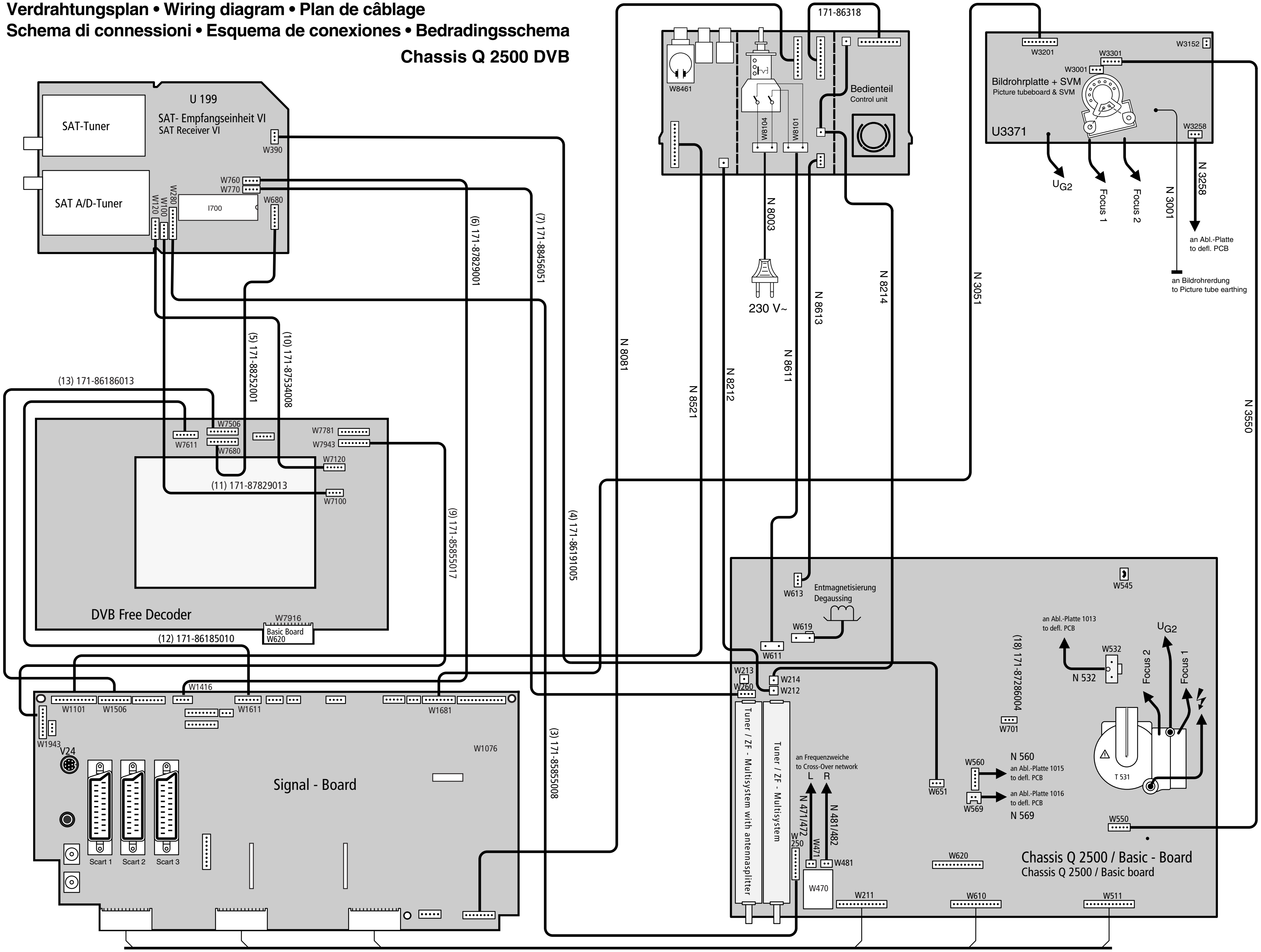

Metallabdeckung (hinten)
Metal cover (rear)
Couverture métallique (postérieur)
Coperchio di metallo (posteriore)
Cubierta metálica (trasera)
Metale afdekking (achter)
Verlängerungskabel (Bestell-Nr. 291-90274.920)
Extension cable (Part number 291-90274.920)
Câble de prolongement (Numéro de commande 291-90274.920)
Cavo di prolunga (Numero d’ordinazione 291-90274.920)
Cable alargador (n° de pedido 291-90274.920)
Verlengkabel (Bestelnr. 291-90274.920)
Signal-Board
W1731
W1311
W1003
W511
W610
W211
Basic-Board
W1003
W1311
W1731
Signal-Board
W1681

Abb. 6
Fig. 6
Afb. 6

Abb. 7
Fig. 7
Afb. 7

Verdrahtungsplan • Wiring diagram • Plan de câblage
Schema di connessioni • Esquema de conexiones • Bedradingsschema
Chassis Q 2500 DVB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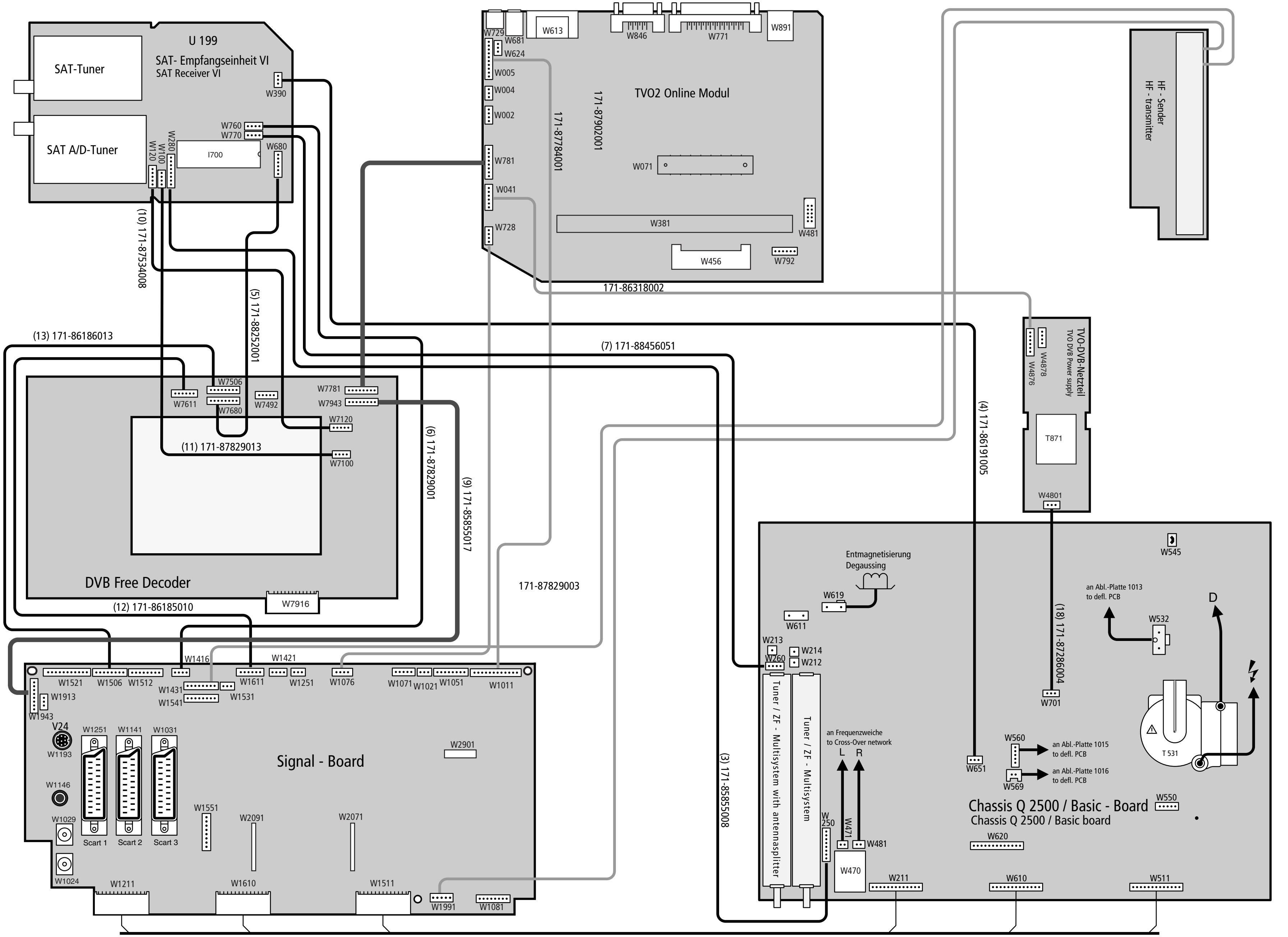
SAT-Tuner
SAT- Empfangseinheit VI
SAT Receiver VI
W390
SAT A/D-Tuner
W760
W770
W680
W280
W100
W120
I700
(6) 171-87829001
(7) 171-88456051
(5) 171-88252001
(10) 171-87534008
(13) 171-86186013
W7506
W7611
W7680
W7781
W7943
W7120
(11) 171-87829013
W7100
DVB Free Decoder
W7916
Basic Board
W620
(12) 171-86185010
(9) 171-85855017
(4) 171-86191005
(3) 171-85855008
W1416
W1101
W1506
W1611
W1681
W1943
V24
W1076
Signal - Board
Scart 1
Scart 2
Scart 3
171-86318
W8461
W8104
W8101
Bedienteil
Control unit
N 8003
230 V~
N 8081
N 8521
N 8212
N 8611
N 8613
N 8214
N 3051
W3201
W3301
W3001
W3152
Bildrohrplatte + SVM
Picture tubeboard & SVM
U3371
W3258
UG2
Focus 1
Focus 2
N 3001
N 3258
an Abl.-Platte
to defl. PCB
an Bildrohrerdung
to Picture tube earthing
N 3550
W613
Entmagnetisierung
Degaussing
W619
W611
W545
an Abl.-Platte 1013
to defl. PCB
UG2
W532
N 532
Focus 2
Focus 1
(8) 171-87286004
W701
W213
W260
W214
W212
Tuner / ZF - Multisystem with antennasplitter
Tuner / ZF - Multisystem
an Frequenzweiche
to Cross-Over network
L
R
N 471/472
N 481/482
W250
W471
W481
W470
W651
W560
W569
N 560
an Abl.-Platte 1015
to defl. PCB
an Abl.-Platte 1016
to defl. PCB
N 569
T 531
W550
W620
Chassis Q 2500 / Basic - Board
Chassis Q 2500 / Basic board
W211
W610
W511

			61401.62	61402.62	61404.63	61405.52	61405.62	61406.63	61450.62	61465.62	61466.62
N 471	85909052	KABELBAUM 2-POL1400LG SW/GN BV171-85909		X							
	85909053	KABELBAUM 2-POL1000LG SW/GN BV171-85909			X		X	X	X		
N 472	88243053	KABELB. 3/2POL 1000LG GR LV171-88243									X
	88247051	KABELB. 3/2POL 1000LG GR/WS LV171-88247	X			X		X	X	X	
	88247052	KABELB. 3/2POL 1400LG GR/WS LV171-88247		X							
N 475	88186051	MASSELEITUNG GRUEN 550MM 1X0,5MM2 LV			X	X	X				
N 481	85909051	KABELBAUM 2-POL1000LG SW/GE BV171-85909		X	X		X	X	X		
N 482	88243052	KABELB. 3/2POL 1000LG OR LV171-88243									X
	88247053	KABELB. 3/2POL 1000LG OR/WS LV171-88247	X	X		X		X	X	X	
N 532	87586052	KABELBAUM H-ABLENK. 2POL 600LG USA LV						X			
	87586053	KABELBAUM H-ABLENK. 2POL 600LG USA LV	X								
	87814050	KABELB.H-ABLENKUNG 550LG BV171-87814								X	X
	87844050	KABELBAUM 2-POL 550LG BL/GE BV171-87844							X		
	87983051	KABELBAUM 2-POL 550LG H-A/UL LV171-87983		X	X	X	X	X			
N 560	86188	KABELBAUM 4-POL 500LG NATUR LV171-86188						X			
N 569	88205051	KABELBAUM V-ABLENKUNG 2-POL 550LG LV		X					X		
	88206051	KABELBAUM V-ABLENKUNG 2/3-POL 550LG LV			X	X	X				
	88207051	KABELBAUM V-ABLENKUNG 2/3-POL. 550LG LV								X	X
	88218051	KABELBAUM V-ABLENKUNG 2-POL. 550LG	X					X			
N 881	87338001	KABEL IR 2POL LV 169-87338			X				X		
N3001	87838050	KABELBAUM 1-POL 400LG GRUEN BV171-87838	X	X	X	X	X	X	X	X	X
N3051	87886001	KABELBAUM 9-POL 400LG NATUR LV171-87886	X	X	X	X	X	X	X		
	88129001	KABELB. 9-POL 400LG UL NATUR LV171-88129								X	X
N3258	86191006	KABELBAUM 3-POL 200LG NATUR LV171-86191		X	X	X	X	X	X		
	88452001	KABELBAUM 3-POL. 200LG LV171-88452								X	X
	88452101	KABELBAUM 3-POL. 200LG LV171-88452	X								
	88481001	KABELBAUM 3/2-POL. 120LG LV171-88481						X			
N3550	87534006	KABELBAUM 5-POL. 500LG NATUR	X	X	X	X	X		X	X	X
	87534009	KABELBAUM 5-POL. 550LG NATUR						X			
N6001	87154002	ERDUNGSBAND 600MM LG.									X
	87154003	ERDUNGSBAND 770MM LG.	X	X	X	X	X		X	X	
N6002	87154002	ERDUNGSBAND 600MM LG.						X			
N8003	29158003	NETZKABEL DR. 3400MM 0,75 SW JST LV	X	X	X	X	X	X			
N8015	87878050	MASSELEITUNG GRUEN 300LG LV171-87878	X							X	X
N8081	85855006	KABELBAUM 8-POL1200LG SCHW. LV171-85855		X	X	X	X	X			
	85855056	KABELBAUM 8-POL 1200LG UL SW LV	X							X	
N8212	88211052	KABELBAUM 1-POL 650LG ESD LV171-88211	X	X	X	X	X	X		X	X
N8214	88211052	KABELBAUM 1-POL 650LG ESD LV171-88211								X	X
N8521	87791001	KABELBAUM 11POL. 800LG. NATUR	X	X	X	X	X	X			
	87791002	KABELBAUM 11-POL 600LG NATUR LV171-87791								X	X
N8611	88204052	KABELBAUM NETZV. 2-POL 500LG SW/SW LV	X	X	X	X	X	X	X	X	
	88204053	KABELBAUM NETZV. 2-POL 700LG SW/SW LV					X	X			X
N8613	88355052	KABELBAUM NETZV. 3(5)-POL 600LG NAT LV	X	X	X	X	X	X	X	X	X
	88355053	KABELBAUM NETZV. 3(5)-POL 900LG NAT LV					X	X			X

Verdrahtungsplan • Wiring diagram • Plan de câble • Schema di connessioni • Esquema de conexiones • Bedradingsschema

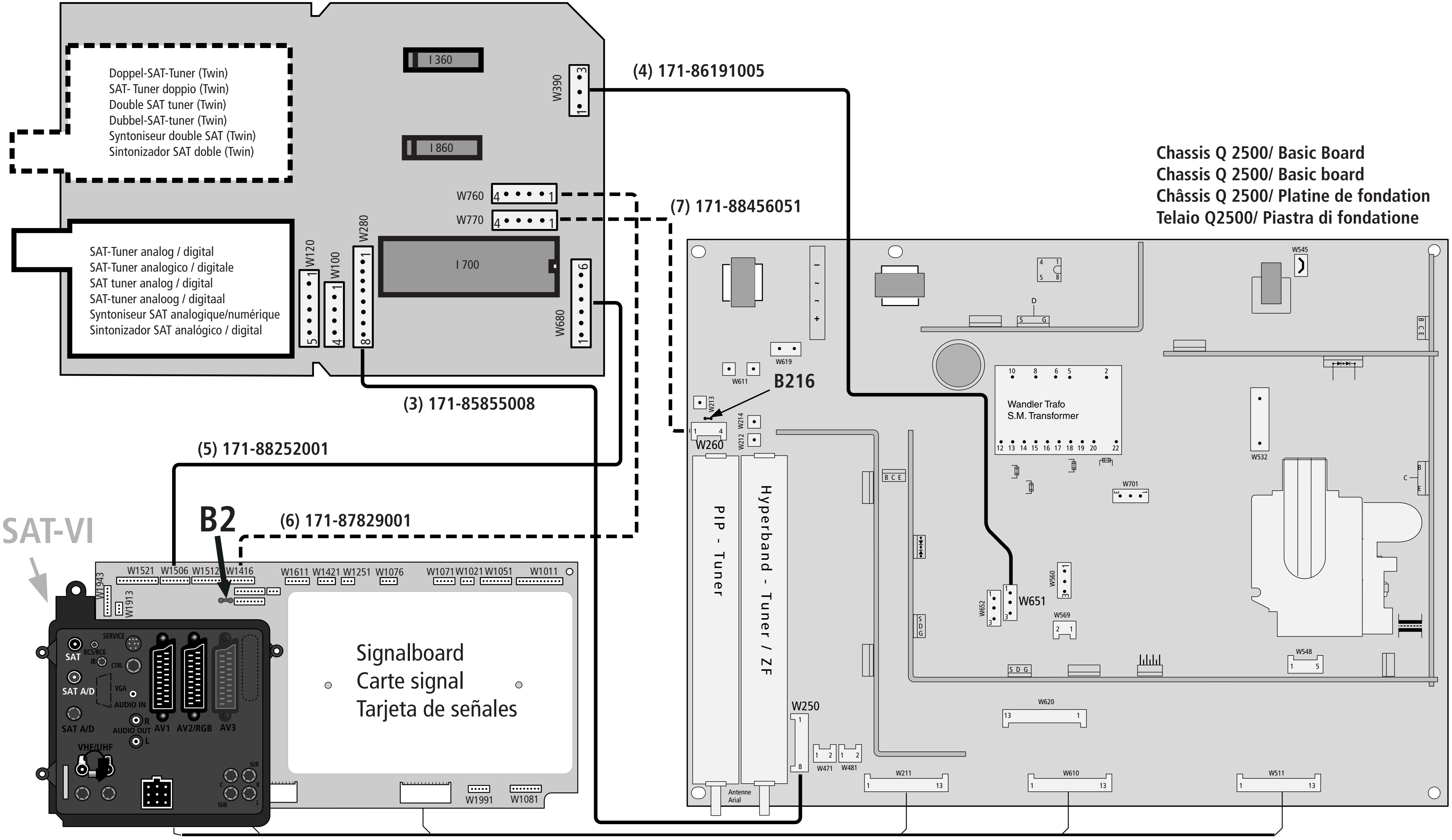
Chassis MediaPlus - DVB
TVO - Twin SAT VI - HF


U 199
SAT-Tuner
SAT- Empfangseinheit VI
SAT Receiver VI
SAT A/D-Tuner
W390
W760
W770
W680
I700
W280
W100
W120
(10) 171-87534008
(5) 171-88252001
(13) 171-86186013
(11) 171-87829013
(12) 171-86185010
(6) 171-87829001
(9) 171-85855017
(7) 171-88456051
(4) 171-86191005
(3) 171-85855008
(18) 171-87286004
171-87829003
171-87784001
171-87902001
171-86318002
W7506
W7611
W7680
W7492
W7781
W7943
W7120
W7100
W7916
DVB Free Decoder
W729
W681
W624
W613
W846
W771
W891
W005
W004
W002
W781
W041
W728
TVO2 Online Modul
W071
W381
W481
W456
W792
HF - Sender
HF - transmitter
TVO-DVB-Netzteil
TVO DVB Power supply
W4878
W4876
T871
W4801
W1521
W1506
W1512
W1416
W1421
W1611
W1251
W1076
W1071
W1021
W1051
W1011
W1431
W1541
W1531
W1913
W1943
V24
W1193
W1251
W1141
W1031
W1146
W1029
W1024
Scart 1
Scart 2
Scart 3
Signal - Board
W2901
W1551
W2091
W2071
W1211
W1610
W1511
W1991
W1081
Entmagnetisierung
Degaussing
W619
W611
W213
W260
W214
W212
W545
an Abl.-Platte 1013
to defl. PCB
W532
D
W701
Tuner / ZF - Multisystem with antennasplitter
Tuner / ZF - Multisystem
an Frequenzweiche
to Cross-Over network
L
R
W250
W471
W481
W470
W560
an Abl.-Platte 1015
to defl. PCB
W569
an Abl.-Platte 1016
to defl. PCB
W651
T 531
Chassis Q 2500 / Basic - Board
Chassis Q 2500 / Basic board
W550
W620
W211
W610
W511

Verdrahtungsplan • Wiring diagram • Plan de câble • Schema di connessioni • Esquema de conexiones • Bedradingsschema

Chassis MediaPlus SAT VI /
Twin SAT VI

SAT/Twin-SAT-Nachrüstsatz VI
SAT retrofit kit VI
Lot deraltrapage SAT VI
Kit di equipaggiamento successivo SAT VI



Doppel-SAT-Tuner (Twin)
SAT- Tuner doppio (Twin)
Double SAT tuner (Twin)
Dubbel-SAT-tuner (Twin)
Syntoniseur double SAT (Twin)
Sintonizador SAT doble (Twin)
I 360
I 860
I 700
W390
W760
W770
W280
W120
W100
W680
SAT-Tuner analog / digital
SAT-Tuner analogico / digitale
SAT tuner analog / digital
SAT-tuner analoog / digitaal
Syntoniseur SAT analogique/numérique
Sintonizador SAT analógico / digital
(4) 171-86191005
(7) 171-88456051
(3) 171-85855008
(5) 171-88252001
(6) 171-87829001
Chassis Q 2500/ Basic Board
Chassis Q 2500/ Basic board
Châssis Q 2500/ Platine de fondation
Telaio Q2500/ Piastra di fondatione
B216
W619
W611
W213
W214
W212
W260
PIP - Tuner
Hyperband - Tuner / ZF
Wandler Trafo
S.M. Transformer
W545
W532
W701
W560
W652
W651
W569
W548
W620
W250
W471
W481
W211
W610
W511
Antenne
Arial
SAT-VI
B2
W1521 W1506 W1512 W1416
W1611 W1421 W1251 W1076
W1071 W1021 W1051
W1011
W1943
W1913
Signalboard
Carte signal
Tarjeta de señales
W1991
W1081
SERVICE
SAT
RC5/RC6
IR
CTRL
SAT A/D
VGA
AUDIO IN
SAT A/D
AUDIO OUT
R
L
AV1
AV2/RGB
AV3
VHF/UHF
SUB

Anordnung der SERVICE-Mode-Befehle auf der Fernbedienung
Arrangement of the SERVICE Mode commands on the remote control
Arrangement des instructions du mode SERVICE sur la télécommande
Ordine dei comandi nel “modo di SERVIZIO” sul telecomando
Disposición de los comandos del modo SERVICIO en el mando a distancia
Rangschikking van de SERVICE-mode-functie’s op de afstandsbediening

Einstieg in den Service-Mode

*) Funktionstaste ↻ auf der Ortsbedienung fünfmal drücken (Anzeige „Service“ markiert), anschließend innerhalb 1 sec. Taste „M” auf der Fernbedienung zu drücken.

Entering Service Mode

*) On the local control press function key ↻ five times (indication “Service” will appear), afterwards within a sec. Press key “M” on the remote control.

Entrée dans le mode maintenance

*) Poussez cinq fois la touche fonction ↻ sur la commande locale (indication «Service» apparaît), après cela poussez la touche «M» sur la télécommande en une sec.

Attivazione del modo di servizio

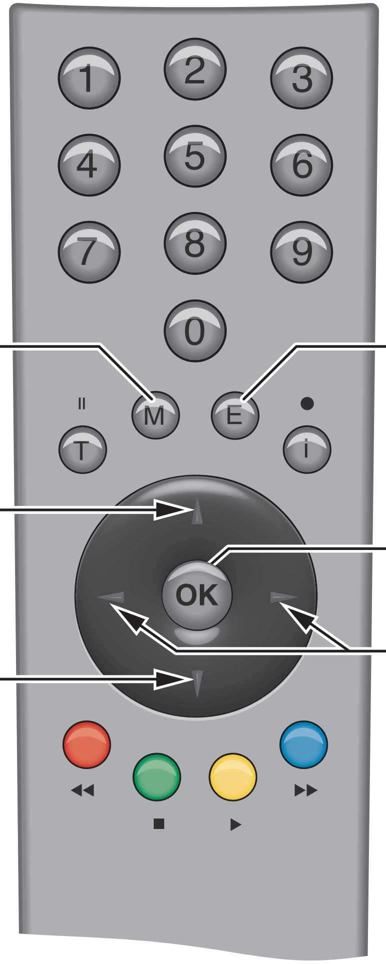
*) Sui comandi nell’apparecchio premere cinque volte il tasto funzione ↻ (indicatore „Service“ appare), successivamente entro un sec. premere il tasto “M” con il telecomando.

Entrada al modo SERVICE

*) Pulsar cinco veces la tecla de función ↻ en el televisor (aparece el diálogo “Service”) y a continuación pulsar el botón “M” del mando a distancia en el plazo de 1 segundo.

Overschakelen op de service-mode

*) Druk vijf keer op de functietoets ↻ op het toestel (indicatie “Service” verschijnt), druk aansluitend binnen 1 sec. op de toets “M” op de afstandsbediening.



Einschalten TV-Service-Mode *)

Switching to TV-Service Mode *)
Enclenchement du mode Service TV *)
Inserimento modi di servizio TV *)
Modo SERVICE de encendido del televisor *)
Einschalten TV-Service-Mode *)
TV-service-mode Inschakelen*)

Auswahl der Abgleichfunktionen

Calling of the alignment functions
Selection des fontions de réglage
Selezione delle funzioni di taratura
Selección de las funciones de ajuste
Afstemmingsfunties kiezen

Service Mode AUS/Off/Arrêt/Spento/Apagado
Uit
zurück in den TV-Betrieb

Return to TV operating mode
Retour au mode TV
Ritorna su TV
Vuelta al funcionamiento como televisor
Terug naar TV-weergave

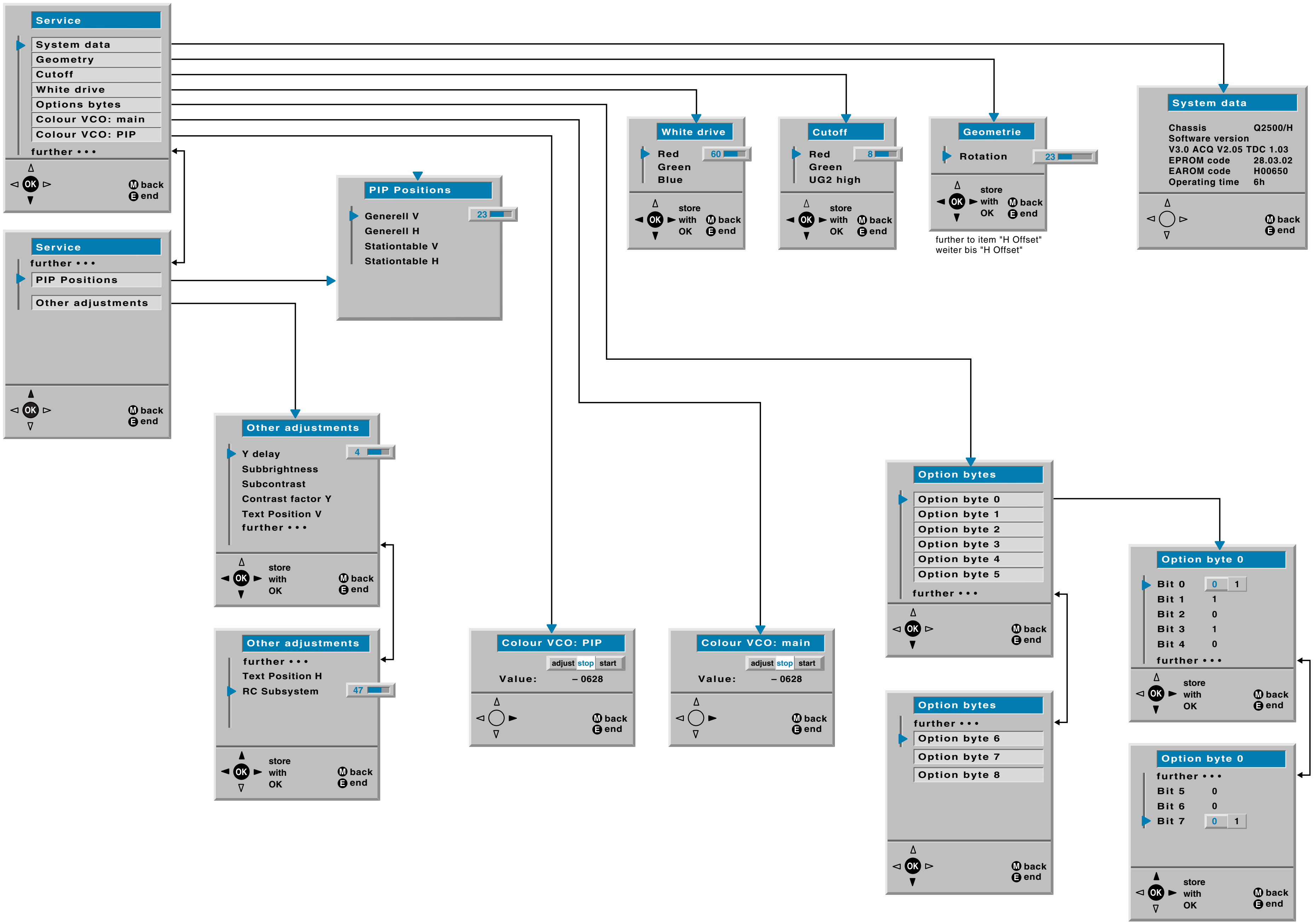
Abgleichwert abspeichern

Storing of alignment value in memory
Memorisation de la valeur reglée
Memorizzazione dei valori di taratura
Memorización del valor de ajuste
Afstemmingswaarde opslaan

Abgleich der angewählten Funktionen

Alignment of the function called
Réglage de la fonction selectionnée
Regolazione della funzione selezionata
Comprobación de las funciones seleccionadas
Geselecteerde functies afstemmen

Service Menü • Service menu • Menu de service • Menu di servizio • Menú SERVICE • Service menu (MediaPlus)


Service
System data
Geometry
Cutoff
White drive
Options bytes
Colour VCO: main
Colour VCO: PIP
further • • •
OK
back
end
Service
further • • •
PIP Positions
Other adjustments
back
end
PIP Positions
Generell V
23
Generell H
Stationtable V
Stationtable H
White drive
Red
60
Green
Blue
store with OK
back
end
Cutoff
Red
8
Green
UG2 high
store with OK
back
end
Geometrie
Rotation
23
store with OK
back
end
further to item "H Offset"
weiter bis "H Offset"
System data
back
end
Other adjustments
Y delay
4
Subbrightness
Subcontrast
Contrast factor Y
Text Position V
further • • •
store with OK
back
end
Other adjustments
further • • •
Text Position H
RC Subsystem
47
store with OK
back
end
Colour VCO: PIP
adjust stop start
Value: – 0628
back
end
Colour VCO: main
adjust stop start
Value: – 0628
back
end
Option bytes
Option byte 0
Option byte 1
Option byte 2
Option byte 3
Option byte 4
Option byte 5
further • • •
back
end
Option bytes
further • • •
Option byte 6
Option byte 7
Option byte 8
back
end
Option byte 0
Bit 0 0 1
Bit 1 1
Bit 2 0
Bit 3 1
Bit 4 0
further • • •
store with OK
back
end
Option byte 0
further • • •
Bit 5 0
Bit 6 0
Bit 7 0 1
store with OK
back
end

Chassis Q2500/H
Software version
V3.0 ACQ V2.05 TDC 1.03
EPROM code 28.03.02
EAROM code H00650
Operating time 6h

D

Abgleich-Anweisung

Service-Mode MediaPlus 30.10.99

1. Funktion

Der Service-Mode macht den Abgleich variabler EAROM-Werte möglich und gestattet die Geräteprogrammierung über Service-Schnittstelle mittels PC/TV-Programmer. Der PC/TV-Programmer verbindet einen vorhanden PC über V24 mit der Service-Schnittstelle vom TV. Mit Hilfe der beiliegenden Software ist es dem Außendienstmitarbeiter möglich, eine für seinen Bezirk übliche Standard-Geräteprogrammierung (Kanalnummern, Programmnamen z.B. im Bereich von Kabelnetzen) in wenigen Sekunden mühelos und fehlerfrei durchzuführen. Auch kann damit das EAROM editiert und als Datei im PC abgespeichert werden.

Achtung!

Ein Software-Update für das Digital/TV - Board (DVB) ist **nur** über den PC/TV-Programmer möglich!

Den PC/TV-Programmer (Art.-Nr. 87933-050) beziehen Sie bitte über die Loewe-Kundendienstzentrale Kronach.

Der PC/TV-Programmer ist für die Chassisgeneration MediaPlus (Q 2400 / Q 2500) und folgende vorgesehen. Für ältere Chassisgenerationen ist er nicht verwendbar.

Eine detaillierte Gebrauchsanweisung liegt dieser nützlichen Servicehilfe bei, so daß an dieser Stelle nähere Ausführungen entfallen können.

Die PC/TV-Programmer Software V2.6 wird für Chassis Q 2500 zwingend benötigt. Die SW-Version V2.6 ist abwärtskompatibel und bedient somit auch das Chassis Q 2400. Update auf V2.6 über ISDN-InfoTip und Ftp-Server - siehe TK-Info Nr. 2001/4 - möglich. ftp://ftp.loewe/public/TKService/Software/

2. Einstieg in den Service-Mode

Die Einstellfolge für den Service-Mode entnehmen Sie bitte vom Text des Bildes: „Anordnung der Service-Mode Befehle auf der Fernbedienung" (S. 25). Befindet sich nun das Gerät in der Service-Mode-Grundeinstellung , wird dies mit folgender OSD-Einblendung (Service-Menü) dokumentiert.

3. Hinweise zum Geometrieabgleich

Vertikalamplitude, Vertikal-Position, V-Linearität, V-Symmetrie, Horizontal-Amplitude, H-Phase, Ost/West , Trapez usw.

werden getrennt für 50/60Hz Bildfrequenzen abgespeichert und müssen deshalb getrennt eingestellt werden:

Bildröhre:	4:3	16:9
	Testbild:	Testbild:
- 50Hz	4:3	16:9
- 60Hz	4:3	16:9

GB

Adjustment procedures

Service-Mode MediaPlus 30.10.99

1. Function

Service mode enables the comparison of EAROM variables and permits unit programming via the service interface using a PC/TV programmer. The PC/TV programmer connects an available PC to the service interface of the TV via V24. Using the software provided, the service representative can easily perform the standard unit programming required for his region (channel numbers, program names, e.g. for cable networks) within seconds. This can also be used to edit and save EAROM as a file on the PC.

Important

A software update for the digital/TV board (DVB) is **only** possible via the PC/TV programmer.

The PC/TV programmer is available from the Loewe customer service centre in Kronach (Item No. 87933-050).

The PC/TV programmer is intended for the MediaPlus chassis generation (Q 2400 / Q 2500) and subsequent generations. It is not suitable for older chassis generations.

No further explanations are required at this point, since detailed operating instructions are provided with this useful service facility.

The PC/TV Programmer software V2.6 is absolutely essential for chassis Q 2500. The SW version V2.6 is downward-compatible and therefore also operates chassis Q 2400. Update to V2.6 possible with ISDN-InfoTip and Ftp server – see TK Info no. 2001/4. ftp://ftp.loewe/public/TKService/Software/

2. Entering Service Mode

The Adjustment sequence for the service mode is indicated in the pictures: "Arrangement of the service mode commands on the remote control" (p. 25). The set is now in the service mode basic routine and documents this with the following on-screen display (Servicem menu).

3. Instructions on Geometry Alignment

Vertical amplitude, Vertical position, Vertical linearity, Vertical symmetrie, Hor. amplitude, Hor. phase, E-W corr., Trapezium comp., etc will be adjustet separately for 50/60Hz vertical frequencies. Therefore they have to be regulated separately.

CRT:	4:3	16:9
	Test pattern:	Test pattern:
- 50Hz	4:3	16:9
- 60Hz	4:3	16:9

F

Instructions d'alignement

Service-Mode MediaPlus 30.10.99

1. Fonction

Le mode Service permet l'alignement des valeurs variables de l'EAROM ainsi que la programmation de l'appareil via l'interface de service, grâce au programmateur PC/TV. Le programmateur PC/TV permet de relier un PC à l'interface de service du téléviseur via V24. Grâce au logiciel fourni, le technicien d'entretien peut procéder à une programmation standard de l'appareil en quelques secondes et sans difficulté ni risque d'erreur (numéro de canal, nom du programme, p. ex. réseaux de câbles). L'EAROM peut alors être également éditée et sauvegardée comme fichier sur le PC.

Attention !

La mise à jour du logiciel de la carte numérique/TV (DVB) n'est possible **que** via le programmateur PC/TV !

Le programmateur PC/TV (réf. 87933-050) est disponible auprès du service après-vente Loewe de Kronach.

Le programmateur PC/TV est conçu pour la génération de châssis MediaPlus (Q 2400 / Q 2500) et suivantes. Il ne peut être utilisé avec les générations de châssis antérieures.

La présente documentation de service après-vente inclut une notice d'utilisation détaillée, ce qui rend superflue toute explication détaillée ici.

Le logiciel V2.6 de programmation PC/TV doit être impérativement utilisé sur le châssis Q2500. Compatible en aval, la version V2.6 est également adaptée pour le châssis Q 2400. Une mise à jour de V2.6 est possible via ISDN-InfoTip et Ftp-Server – voir TK-Info n°2001/4. ftp://ftp.loewe/public/TKService/Software/

2. Entrée dans le mode maintenance

La série des réglages en mode service vous est donnée par le texte de l'image: "Arrangement des instructions du mode service sur la télécommande" (p. 25). L'appareil se trouve alors en position de base du service maintenance et le documente par la superposition OSD (Menu de service) suivante.

3. Remarques concernant l'alignement de la géométrie

Ampl. verticale, Position verticale, Linéarité verticale, Symétrie verticale, Ampl. horizontale, phase horizontale, Correction E-O , Correction trapéze etc sont mémorisés séparément pour les fréquences d'image 50/60Hz et doivent donc être réglés séparément.

Écran:	4:3	16:9
	Mire de couleur:	Mire de couleur:
- 50Hz	4:3	16:9 und 4:3
- 60Hz	4:3	16:9 und 4:3

I

Istruzioni Allineamento

Service-Mode MediaPlus 30.10.99

1. Funzione

La modalità Servizio consente la verifica di valori EAROM variabili e consente la programmazione dell’apparecchio tramite l’interfaccia di servizio e mediante il programmatore PC/TV. Tale programmatore collega un PC tramite l’interfaccia di servizio V24 della TV. Con l’ausilio del software è possibile per un dipendente in servizio esterno eseguire per la sua zona la normale programmazione standard dell’apparecchio (numeri canale, nomi di programma, ad es. nell’ambito di reti elettriche) in pochi secondi e senza troppe difficoltà o errori. Anche l’EAROM può essere editato in questo modo e memorizzato come file nel PC.

Attenzione!

Un aggiornamento del software della scheda digitale/TV (DVB) è possibile **solo** tramite il programmatore PC/TV!

Potete ordinare il programmatore PC/TV (no. art. 87933-050) presso il servizio assistenza clienti centrale Loewe di Kronach.

Il programmatore PC/TV è previsto per la generazione di telai MediaPlus (Q 2400 / Q 2500) e seguenti. Esso non è utilizzabile per generazioni di telai precedenti.

Sono allegate a queste istruzioni per l’uso Istruzioni dettagliate di assistenza; è possibile pertanto tralasciare in questa sede spiegazioni più dettagliate.

Il software programmatore PC/TV V2.6 per chassis Q 2500 è assolutamente necessario. La versione SW V2.6 è compatibile verso l’alto e quindi comanda anche chassis Q 2400. Aggiornamento possibile su V2.6 mediante ISDN-Info Tip e server Ftp – vedi TK-Info n° 2001/4.
ftp://ftp.loewe/public/TKService/Software/

2. Attivazione del modo di servizio

L’ordine del lavori di regolazione nel modo di servizio - riportato nel testo del quadro "Ordine dei comandi di servizio sul telecomando" (p. 25).

Adesso l’apparecchio si trova in modalità Service - Posizione iniziale il che viene dimostrato dal seguente messaggio OSD (Menu di servizio).

3. Istruzione per l’allineamento geometrico

Ampiezza verticale, Posizione verticale, Linearita verticale, Simmetria verticale, Ampiezza orizzontale, Fase orizzontale, E-O, Correz. trapezoidale etc vengono memorizzati separatamente per le frequenze d'immagine 50/60Hz e quindi si devono impostare a parte.

Cinescopio:	4:3	16:9
	Immagine di prova:	Immagine di prova:
- 50Hz	4:3	16:9 und 4:3
- 60Hz	4:3	16:9 und 4:3

E

Instrucciones de ajuste

Modo Service MediaPlus 30.10.99

1. Funcionamiento

El modo de servicio posibilita el ajuste de los valores variables EAROM y permite la programación de los aparatos a través de la interfaz de servicio, mediante el programador PC/TV. El programador PC/TV conecta un PC ya montado en 24V con la interfaz de servicio del televisor. El técnico de servicio exterior de posventa puede, gracias al software suministrado, realizar en pocos segundos, sin esfuerzo y sin errores una programación de aparatos corriente en su región (números de canal, nombres de programas, p.ej. en el área de las redes de cables). También se puede editar el EAROM y se puede guardar como archivo en el PC.

¡Atención!

La actualización del software para la tarjeta digital/TV (DVB) **sólo** es realizable con el programador PC/TV.

Para adquirir el programador PC/TV (nº. art.: 87933-050) diríjase a la central de servicio al cliente de Loewe en Kronach.

El programador PC/TV está previsto para la generación del chasis MediaPlus (Q 2400 / Q 2500) y las siguientes. Sin embargo no se puede utilizar para las generaciones de chasis más antiguas.

Esta útil ayuda de servicio viene acompañada de un consejo de utilización en detalle, de manera que en este punto no merece detenerse en dar más explicaciones.

El software V2.6 de programación de PC/TV es imprescindible para el chasis Q 2500. La versión V2.6 del software es compatible con versiones anteriores, por lo que también puede utilizarse con el chasis Q 2400. La actualización a la versión V2.6 es posible a través de ISDN-InfoTip y del servidor FTP (véase TK-Info, n° 2001/4). ftp://ftp.loewe/public/TKService/Software/

2. Entrada al modo Service

Consulte los pasos para acceder al modo Service en los textos de la figura ”Disposición de los comandos del modo SERVICE en el mando a distancia” (pág. 25). Cuando el aparato pasa al modo Service básico, aparece la siguiente sobreimpresión OSD (Menú servico).

3. Notas para el ajuste geométrico

Los valores de amplitud vertical, posición vertical, linealidad vertical, simetría vertical, amplitud horizontal, fase horizontal, Este/Oeste, trapezoide, etc., se memorizan por separado para las frecuencias de imagen de 50/60 Hz y por ello deben ajustarse individualmente.

Tupo de imagen:	4:3	16:9
	Carta de ajuste:	Carta de ajuste:
- 50Hz	4:3	16:9 und 4:3
- 60Hz	4:3	16:9 und 4:3

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Afstemmeingsinstructie

Service mode MediaPlus 30.10.99

1. Functie

In de service-mode kunnen variabele EAROM-waarden afgestemd en kan het toestel via de service-interface door middel van de PC/TV-programmer worden geprogrammeerd. De PC/TV-programmer verbindt een pc via V24 met de service-interface van de TV. Met behulp van de meegeleverde software kan de buitendienstmedewerker moeiteloos in enkele seconden een voor zijn gebied gebruikelijke foutloze standaardprogrammering van het toestel (kanaalnummers, zendernamen bijv. bij kabelnetten) uitvoeren. Ook kunnen hiermee de gegevens van het EAROM worden bewerkt en als bestand op de pc worden opgeslagen.

Let op!

Een software-update voor het Digital/TV - Board (DVB) is **uitsluitend** via de PC/TV-programmer mogelijk!

De PC/TV-programmer (art.nr. 87933-050) is te bestellen bij de Loewe-Klantenservice in Kronach.

De PC/TV-programmer is ontworpen voor chassisgeneraties vanaf MediaPlus (Q 2400 / Q 2500). De programmer is niet geschikt voor oudere chassisgeneraties.

Deze handige servicehulp wordt geleverd met een gedetailleerde gebruiksaanwijzing. Daarom wordt hier in de servicehulp niet verder op ingegaan.

De PC/TV-programmeersoftware V2.6 is voor het chassistype Q 2600 absoluut vereist. Programmaversie V2.6 is compatibel met oudere chassistypes en kan dus ook worden gebruikt voor het bedienen van chassistype Q 2400. Updaten naar V2.6 is mogelijk via ISDN-InfoTip en via de FTP-server - zie TK-info nr. 2001/4. ftp://ftp.loewe/public/TKService/Software/

2. Omschakelen op service mode

Hoe u de service mode instelt, wordt beschreven bij de afbeelding: “Rangschikking van de service mode-functie’s op de afstandsbediening” (zie pagina 25). Als het toestel zich nu in de basisinstelling van de service mode bevindt, verschijnt de volgende tekst op het beeldscherm(Sevice menu).

3. Aanwijzingen voor het afstemmen van de geometrie

Verticale amplitude, verticale stand, V-lineariteit, V-symmetrie, horizontale amplitude, H-fase, oost/west , trapezium, enz.
worden afzonderlijk voor 50/60Hz beeldfrequenties opgeslagen en moeten daarom afzonderlijk worden ingesteld:

Beeldbuis:	4:3	16:9
	Testbeeld:	Testbeeld:
- 50Hz	4:3	16:9 und 4:3
- 60Hz	4:3	16:9 und 4:3

D

4. Abgleichfunktionen (0-12)

GB

4. Alignment functions (0-12)

F

4. Fonctions d’alignement (0-12)

Abgleichfunktion **Alignment functions** **Fonction d'alignement**		**Anzeige - Bildschirm z.B.** **Display - Screen e.g.** **Affichage écran p.ex.**	**Einstellwerte / Besonderheiten** **Settings / special features** **Valeurs de réglage / Particularités**
0	Bild drehen Rotate picture Rotation de l’image	Geometrie Rotation xxx	Bei Geräten mit Rotationsspule kann das Bild gedreht werden. Optionale Einstellung The picture can be rotated in sets with rotation coil. Optimum setting La rotation de l’image est possible sur les appareils équipés d’une bobine de rotation. Réglage optimal
1	V Slope	Geometrie V Slope xxx	Parameter so abgleichen, daß das Video ab der Bildmitte ausgetastet wird. Adjust the parameters so that the video is blanked from the centre of the picture. Equilibrer les paramètres de manière à ce que la vidéo soit supprimée à partir du centre de l’image.
2	Vertikal-Amplitude Vertical Amplitude Amplitude Vertical	Geometrie V Amplitude xxx	Optimale Einstellung Optimum setting Réglage optimal FuBK-Farbtestbild Color test pattern (FuBK) Mire de couleur (FuBK)
3	Vertikal-Lage Vertical Position Position Vertical	Geometrie V Position xxx	
4	Vertikal-Symmetrie Vertical Symmetry Symétrie Vertical	Geometrie S Gorvektion xxx	
5	Horizontal-Amplitude Horizontal Amplitude Amplitude Horizontal	Geometrie H Amplitude xxx	
6	Horizontal-Lage Horizontal Position Position Horizontal	Geometrie H Position xxx	Getrennte Einstellungen für die verschiedenen Bildformate (Zoom, Cinema..). Separate settings for different picture formats (zoom, cinema etc…). Réglages séparés pour les différents formats d’image (zoom, cinéma..).
7	OW-Amplitude EW Amplitude Amplitude EO	Geometrie EW Amplit. xxx	Optimale Einstellung Optimum settings Réglage optimal
8	OW oben EW upper En haut EO	Geometrie EW Upper xxx	
9	OW unten EW lower en bas EO	Geometrie EW Lower xxx	
10	Trapez-Korrektur Trapezium Correction Correction Trapéze	Geometrie Trapezium xxx	
11	Vertikal Bogen Vertical Bow Arc Verticale	Geometrie V Bow xxx	
12	Vertikal Winkel Vertical Angle Angle Vertical	Geometrie V Angle xxx	

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4. Funzioni d’allineamento (0-12)

E

4. Funciónes de ajuste (0-12)

NL

4. Afstemmingsfuncties (0-12)

Funzione d'allineamento **Funciónes de ajuste** **Afstemmingsfunctie**		**Indicatore schermo p.es.** **Indicación - p.ej.: pantella** **Weergave - Beeldbuis bijv.**	**Particolarita della posizionatura / Valori di pos.** **Valores de ajuste / Observaciones** **Instelwaarden / Bijzonderheden**
0	Girare l’immagine Rotar la imagen Beeld draaien	Geometrie Rotation xxx	Negli apparecchiu con bobina di rotazione è possibile girare l’immagine. Regolazione ottimale En los aparatos que dispongan de una bobina rotatoria, se podrá rotar la imagen. Ajuste óptimo Bij toestellen met een rotatiespoel kan het beeld gedraaid worden. Optimale instelling
1	V Slope	Geometrie V Slope xxx	Sintonizzare i parametri in modo tale che il video venga soppresso a partire dal centro dell’immagine. Calibrar los parámetros de manera que el vídeo se muestree a partir del centro de la imagen. Stel de parameters zo in dat de video vanuit het midden van het beeld wordt afgetast.
2	Ampiezza Verticale Amplitud Vertical Verticale Amplitude	Geometrie V Amplitude xxx	Regolazione ottimale Ajuste óptimo Optimale instelling Imagine di prova colore (FuBK) Carta de ajuste en color FuBK Kleurentestbeeld (FuBK)
3	Posizione Verticale Posición Vertical Verticale Stand	Geometrie V Position xxx	
4	Simmetria Verticale Simetriá Vertical Verticale Symmetrie	Geometrie S Gorvektion xxx	
5	Ampiezza Orizzontale Amplitud Horizontal Horizontale Amplitude	Geometrie H Amplitude xxx	
6	Posizione Orizzontale Posición Horizontal Horizontale Stand	Geometrie H Position xxx	Impostazioni separate per i diversi formati immagine (zoom, cinema..). Ajustes independientes para los distintos formatos de imagen (Zoom, Cinema, ...) Verschillende instellingen voor de verschillende beeldformaten (zoom, cinema..).
7	Ampiezza EO Amplitud EO OW Amplitude	Geometrie EW Amplit. xxx	Regolazione ottimale Ajuste óptimo Optimale instelling
8	Sopra EO Arriba EO OW boven	Geometrie EW Upper xxx	
9	Giù EO Abajo EO OW onder	Geometrie EW Lower xxx	
10	Correz. Trapezoidale Corrección de Trapezoide Trapezium Correctie	Geometrie Trapezium xxx	
11	Argo Verticale Argo Vertical Verticaal Boog	Geometrie V Bow xxx	
12	Angolo Verticale Angulo Verticale Verticaal Hoek	Geometrie V Angle xxx	

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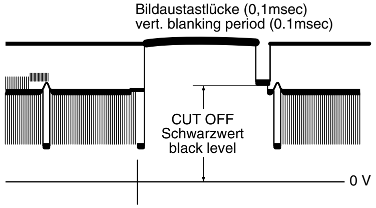
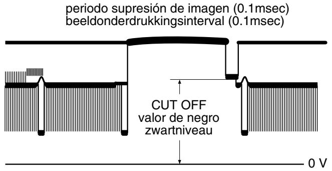
5. Abgleichfunktionen (13-16)

GB

5. Alignment functions (13-16)

Abgleichfunktion **Alignment functions**		**Anzeige - Bildschirm z.B.** **Display - Screen e.g.**	**Einstellwerte / Besonderheiten** **Settings / special features**
13	Horizontal Offset	Geometrie H Offset xxx	Bild auf Mittelposition abgleichen, d. h. der Rand auf beiden Seiten soll gleiche Breite haben. Adjust the picture to the centre position, i.e. the edge should have the same width on both sides.
14a	Cutoff-Meßimpuls Cutoff Measuring Pulse	Cutoff Red xxx Green xxx Blue xxx	An den Farbendstufen messen (MP 1,2,3), welche die höchste Spannung zeigt. Mit Ug2-Regler im DST oder Reglerblock einstellen: Cutoff = 148 ± 2,5V DC (für Aconda 93102 Cutoff = 158 ± 2,5V) [Vor dieser Einstellung muß Kontrast auf 50, Helligkeit auf 23, Farbsättigung auf 32, Schärfe auf 3 und DNR auf EIN eingestellt werden. Für alle 2 Farben muß Cutoff auf 10 und Weißwert (14) auf 32 stehen! Für 16:9 Geräte muß 16:9 eingeschaltet sein.] Measure the colour output stages (MP 1,2,3) to see which shows the highest tension. With the Ug2 adjuster in DST or adjusting pad, make the following setting: cutoff = 148 ± 2.5 V DC (at Aconda 93102 Cutoff = 158 ± 2,5V) [before making this setting, the contrast must be set to 50, brightness to 23, colour saturation to 32, sharpness to 3 and DNR to ON). For both colours, the cutoff must be 10 and white level (14) must be 32! Regarding 16:9 sets, the 16:9 feature must be activated.]  Bildaustastlücke (0,1msec) vert. blanking period (0.1msec) CUT OFF Schwarzwert black level 0 V
14b	Cutoff-Referenzwert Cutoff Reference Value	Cutoff Red xxx Green xxx	In der Graufläche die beiden fehlenden Farben soweit erhöhen, bis Normschwarz erscheint, anschließend mit Taste ”OK” abspeichern. Im VGA-Modus ist Abgleich mit VGA-Testbild zu wiederholen. In the grey area rise the missing two colours until black becomes standard, then store these values with ”OK” key. Adjustment with VGA test picture must be repeated in VGA mode.
15	Weißwert White Level	White drive Red xxx Green xxx Blue xxx	In der Weißfläche die beiden schwachen Farben soweit erhöhen, bis Normweiß erscheint, jeweils Werte mit Taste ”OK” abspeichern. Im VGA-Modus ist Abgleich mit VGA-Testbild zu wiederholen. Increase both faint colours in the white surface until standard white appears and save each setting by pressing “OK”. Adjustment with VGA test picture must be repeated in VGA mode.
16	Option bytes	Option byte 0 - 8 Bit 7 6 5 4 3 2 1 0 x x x x x x x x	Achtung! Hier nur Eingaben machen und Speicherung vornehmen a) im notwendigen Reparaturfall b) bei gewünschten Programm-/Normänderung: Abgleichart siehe Option Bytes Tabelle Caution! Here inputs and memorizing: a) in the event of necessary repairs b) if you wish to alter programs/norms For alignment method see Option Bytes Table

Funciónes de ajuste **Afstemmingsfunctie**		**Indicación - p.ej.: pantella** **Weergave - Beeldbuis bijv.**	**Valores de ajuste / Observaciones** **Instelwaarden / Bijzonderheden**
13	Horizontal Offset	Geometrie H Offset xxx	Calibrar la imagen a la posición media; eso significa que el borde tiene que tener el mismo ancho a ambos lados. Regel het beeld zo af dat het zich in het midden bevindt, d.w.z. de randen aan weerszijden moeten even breed zijn.
14a	Impulso de medición Cutoff Cutoff-Meetimpuls	Cutoff Red xxx Green xxx Blue xxx	Medir en los pasos finales de color (MP 1,2,3) cuál es el que muestra la mayor tensión. Ajustar con el regulador Ug2 en DST o bloque regulador: Cutoff = 148 ± 2,5 V DC (Aconda 93102 Cutoff=158 ± 2,5V) [Antes de realizar este ajuste se tiene que ajustar el contraste en 50, el brillo en 23, la saturación de color en 32, la claridad en 3 y DNR en Sí. ¡Cada dos colores el Cutoff tiene que estar en 10 y el valor de blanco (14) en 32! Para aparatos 16:9 tiene que estar conmutado 16:9.] Meet welke kleureneindtrap (MP 1, 2, 3) de hoogste spanning heeft. Stel met de Ug2-regelaar in de DST of het controllerblok in: cutoff = 148 ± 2,5 V DC (Aconda 93102 Cutoff=158 ± 2,5V) [hiervoor moet het contrast worden ingesteld op 50, de helderheid op 23, de kleurverzadiging op 32, de scherpte op 3 en DNR op AAN. Voor beide kleuren moet cutoff op 10 en de witwaarde (14) op 32 staan! Voor 16:9-toestellen moet 16:9 ingeschakeld zijn.]  periodo supresión de imagen (0.1msec) beeldonderdrukkingsinterval (0.1msec) CUT OFF valor de negro zwartniveau 0 V
14b	Valor de referencia Cutoff Cutoff-Referentiewaarde	Cutoff Red xxx Green xxx	En el área gris, incrementar los dos colores faltantes hasta que aparezca el nero normalizado. A continuación, memorizar con el botón ”OK”. En el modo VGA deberá repetirse el ajuste con la imagen de prueba VGA. Verhoog de twee ontbrekende kleuren in het grijze vlak tot normzwart verschijnt. Sla de instelling vervolgens met de toets ”OK” op. In de VGA-modus moet het beeld met behulp van het VGA-testbeeld opnieuw worden afgesteld.
15	Valor de blanco Witniveau	White drive Red xxx Green xxx Blue xxx	Aumentar en la superficie blanca los dos colores débiles hasta que aparezca el blanco normalizado, grabar respectivamente los colores con la tecla „OK“. En el modo VGA deberá repetirse el ajuste con la imagen de prueba VGA. Versterk de beide zwakke kleuren in het witte vlak zodanig, dat er normwit verschijnt. Sla de betreffende waarden met de toets „OK“ op. In de VGA-modus moet het beeld met behulp van het VGA-testbeeld opnieuw worden afgesteld.
16	Option bytes	Option byte 0 - 8 Bit 7 6 5 4 3 2 1 0 x x x x x x x x	Atención! Aquí sólo deben introducirse datos y realizar memorizaciones: a) en caso de necesitar una reparación b) para cambiar los datos de programación o la norma Para el tipo de ajuste, véase la tabla de bytes de opción Let op! Hier mogen alleen gegevens worden ingevoerd en opgeslagen a) bij een noodzakelijke reparatie b) bij een gewenste programma-/normwijziging: Afstemmingswijze zie Option Bytes-tabel

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5. Fonctions d’alignement (13-16)

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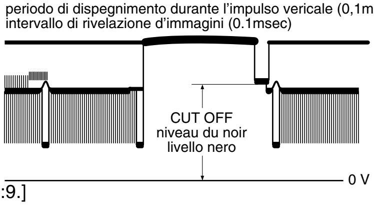
5. Funzioni d’allineamento (13-16)

Fonctions d'alignement Funzioni d'allineamento		Affichage écran p.ex. Indicatore schermo p.es.	Valeurs de réglage / Particularités Particolarita della posizionatura / Valori di pos.
13	Horizontal Offset	Geometrie H Offset xxx	Equilibrer l’image en position centrale, c.-à-d. que la bordure doit avoir la même largeur des deux côtés. Bilanciare l’immagine sulla posizione centrale, vale a dire che il bordo deve avere su entrambi i lati la stessa larghezza.
14a	Impulsion de mesure Cutoff Impulso di misura Cutoff	Cutoff Red xxx Green xxx Blue xxx	Mesurer aux étages de sortie de couleur (MP 1,2,3) lequel montre la tension la plus élevée. Avec le régulateur Ug2 dans le DST ou le bloc régulateur, régler: cutoff = 148 ± 2,5V CC (Aconda 93102 Cutoff =158 ± 2,5V) [Avant ce réglage, le contraste doit être réglé sur 50, la luminosité sur 23, la saturation des couleurs sur 32, la netteté sur 3 et le DNR sur EIN (MARCHE). Pour les 2 couleurs, le cutoff doit être sur 10 et la valeur de blanc (14) sur 32 ! Pour les appareils 16:9, 16:9 doit être activé.] Misurare con gli stadi di uscita del colore (MP 1,2,3), quale di essi presenta la tensione più elevata. Regolare con il regolatore Ug2 nel DST o con il blocco di regolazione: Cutoff = 148 ± 2,5V DC (Aconda 93102 Cutoff =158 ± 2,5V) [Prima di questa impostazione il contrasto va impostato su 50, la luminosità su 23, la saturazione cromatica su 32, la nitidezza su 3 e il DNR su ON. Per tutti i 2 colori il Cutoff deve essere posto su 10 e il livello del bianco (14) su 32! Per apparecchi 16:9 bisogna attivare il 16:9.]  periodo di dispegnimento durante l’impulso vericale (0,1msec) intervallo di rivelazione d’immagini (0.1msec) CUT OFF niveau du noir livello nero 0 V
14b	Valeur de référence Cutoff Valore di riferimento Cutoff	Cutoff Red xxx Green xxx	Dans la surface grise, augmenter les deux couleurs faibles jusqu’à ce que le noir normal apparaisse, puis mémoriser avec la touche ”OK”. En mode VGA, il faut procéder une nouvelle fois au réglage sur la mire VGA. Nella superficie grigia, aumentare i due colori più deboli fino a far apparire il nero di norma. Poi memorizzare con il tasto ”OK”. In modalità VGA va ripetuta la regolazione con immagine di prova VGA.
15	Valeur du blanc Livello bianco	White drive Red xxx Green xxx Blue xxx	Dans la surface des blancs, augmenter les deux couleurs faibles jusqu’à ce que le blanc normalisé apparaisse; enregistrer les valeurs respectives avec la touche ”OK”. En mode VGA, il faut procéder une nouvelle fois au réglage sur la mire VGA. Aumentare nella superficie del bianco i due colori deboli finché non compare bianco standard, e memorizzare i valori premendo sempre il tasto ”OK”. In modalità VGA va ripetuta la regolazione con immagine di prova VGA.
16	Option bytes	Option byte 0 - 8 Bit 7 6 5 4 3 2 1 0 x x x x x x x x	Attention! Ne faire ici que des entrées et procéder à la mémorisation: a) dans le cas où réparation est nécessaire b) dans le cas d'une modification de programme/norme souhaitée Genre d'alignement, voir tableau des bytes d'option Attenzione Qui effettuare solo ingressi e memorizzazioni:! a) in caso di necessita di riparazione b) per modifiche di programma/norma Per il tipo di sintonia vedi l'opzione tabella bytes

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6. Abgleichfunktionen (17-29)

GB

6. Alignment functions (17-29)

Abgleichfunktion **Alignment functions**		**Anzeige - Bildschirm z.B.** **Display - Screen e.g.**	**Einstellwerte / Besonderheiten** **Settings / special features**
17	Farbhilfsträger-Osz. Subcarrier Osc.	Colour VCO: main stop start	Autom. Abgleich Autom. adjustment
18	Farbhilfsträger-Osz. Subcarrier Osc.	Colour VCO: PIP stop start	Autom. Abgleich Autom. adjustment
19	Vertikal-Lage PiP Vertikal Pos. PiP	PiP position General V xxx	Optimale Einstellung im Hauptbild. Optimum setting in the main picture.
20	Horizontal-Lage PiP Horizontal Pos. PiP	PiP position General H xxx	
21	Vertikal-Lage PiP Vertikal Pos. PiP	PiP position Stationtable V xxx	Optimale Einstellung in der Programmübersicht. Optimum setting in the channel overview.
22	Horizontal-Lage PiP Horizontal Pos. PiP	PiP position Stationtable H xxx	
23	Y-Verzögerung Y Delay	Other adjustments Y delay xxx	Optimale Einstellung (getrennt für PAL, NTSC, SECAM) Optimum setting (separate adjustments for PAL, NTSC, SECAM)
24	Helligkeits-Offset Brightness Offset	Other adjustments Subbrightness xxx	Keine Einstellung vornehmen! Don’t adjust!
25	Kontrast-Steilheit Subcontrast	Other adjustments Subcontrast xxx	Mit Gittertestbild bei maximalem Kontrast, Subkontrast so einstellen, daß weiße Linien nicht übersteuern. With the screen test image in maximum contrast, adjust the subcontrast, so that the white lines are not overridden.
26	Kontrastfaktor Contrastfactor	Other adjustments Contrastfactor Y xxx	Keine Einstellungen vornehmen - Wert = 75 No setting exists – value = 75.
27	Vertikal-Lage VT Vertikal Pos. TT	Other adjustments Text Position V xxx	Optimale Einstellung Optimum settings
28	Horizontal-Lage VT Horizontal Pos. TT	Other adjustments Text Position H xxx	
29	RC-Subsystem	Other adjustments RC-Subsystem xxx	Zusätzliche RC 5-Ebene kann zugelassen werden. Additional RC 5 levels are permitted.

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6. Fonctions d’alignement (17-29)

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6. Funzioni d’allineamento (17-29)

Fonctions d'alignement **Funzioni d'allineamento**		**Affichage écran p.ex.** **Indicatore schermo p.es.**	**Valeurs de réglage / Particularités** **Particolarita della posizionatura / Valori di pos.**
17	Sous-porteuse Couleur Osc. del sottoport. colore	Colour VCO: main stop start	Alignement autom. Allineamento autom.
18	Sous-porteuse Couleur Osc. del sottoport. colore	Colour VCO: PIP stop start	Alignement autom. Allineamento autom.
19	Position Vertical PiP Posizione Verticale PiP	Other adjustments PiP Position V xxx	Réglage optimal sur l’image principale. Impostazione ottimale nell’immagine principale.
20	Position Horizontale PiP Posizione Orizz. PiP	Other adjustments PiP Position H xxx	
21	Position Vertical PiP Posizione Verticale PiP	Other adjustments PiP Position V xxx	Réglage optimale dans l’aperçu des chaînes. Impostazione ottimale nel sommario dei programmi.
22	Position Horizontale PiP Posizione Orizz. PiP	Other adjustments PiP Position H xxx	
23	Retard Y Ritardo Y	Other adjustments Y delay xxx	Réglage optimal (réglage séparément pour PAL, NTSC, SECAM) Regolazione ottimale (regolazioni separati per PAL, NTSC, SECAM)
24	Offset luminosité Offset luminosita	Other adjustments Subbrightness xxx	N'effectuez pas de réglage! Non eseguire alcuna impostazione!
25	Sub contraste Sub contrasto	Other adjustments Subcontrast xxx	Avec la grille de test et à contraste maximum, régler le sous-contraste de manière à ce que les lignes blanches ne soient pas surmodulées. Con l’immagine di prova a griglia e contrasto massimo impostare il subcontrasto in maniera tale che le linee bianche non subiscano una distorsione.
26	OSD contraste OSD contrasto	Other adjustments OSD Contrast xxx	Ne pas régler - valeur = 75 Non effettuare nessuna impostazione - valore = 75
27	Position Vertical TT Posizione Verticale TV	Other adjustments Text Position V xxx	Réglage optimal Regolazione ottimale
28	Position Horizontal TT Posizione Orizz. TV	Other adjustments Text Position H xxx	
29	RC-Subsystem	Other adjustments RC-Subsystem xxx	Un niveau RC 5 supplémentaire est acceptable. Può essere ammesso un livello RC 5 supplementare.

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6. Funciónes de ajuste (17-29)

NL

6. Afstemmingsfuncties (17-29)

Funciónes de ajuste **Afstemmingsfunctie**		**Indicación - p.ej.: pantella** **Beeldschermaanduiding bijv.**	**Valores de ajuste / Observaciones** **Instelwaarden / Bijzonderheden**
17	Oscilador de la subportadora de color Kleurdraaggolf-Osc.	Colour VCO: main stop start	Comprobación automática Autom. afstemming
18	Oscilador de la subportadora de color Kleurdraaggolf-Osc.	Colour VCO: PIP stop start	Comprobación automática Autom. afstemming
19	Posición Vertical PiP Verticale Stand PiP	Other adjustments PiP Position V xxx	Ajuste óptimo en la imagen principal. Optimale instelling in het hoofdbeeld.
20	Posición Horizontal PiP Horizontale Stand PiP	Other adjustments PiP Position H xxx	
21	Posición Vertical PiP Verticale Stand PiP	Other adjustments PiP Position V xxx	Ajuste óptimo en el resumen de programas. Optimale instelling in het zenderoverzicht.
22	Posición Horizontal PiP Horizontale Stand PiP	Other adjustments PiP Position H xxx	
23	Retardo Y Y-Vertraging	Other adjustments Y delay xxx	Ajuste óptimo (por separado para PAL, NTSC, SECAM) Optimale instelling (gescheiden voor PAL, NTSC, SECAM)
24	Offset de brillo Helderheids-Offset	Other adjustments Subbrightness xxx	No realizar ningún ajuste! Geen instelling uitvoeren!
25	Sub contraste Contrast-Steilheid	Other adjustments Subcontrast xxx	Con la imagen de ajuste de cuadrículas en contraste máximo se ajustará el subcontraste de manera que las líneas blancas no se sobremodulen. Stel met het rastertestbeeld op maximaal contrast het subcontrast zo in dat witte lijnen niet overstuurd worden.
26	OSD Contraste OSD-Contrast	Other adjustments OSD Contrast xxx	No realizar ningún ajuste – Valor = 75. Niets instellen - waarde = 75
27	Posición Vertical TT Verticale Stand TT	Other adjustments Text Position V xxx	Ajuste óptimo Optimale instelling
28	Posición Horizontal TT Horizontale Stand TT	Other adjustments Text Position H xxx	
29	RC-Subsystem	Other adjustments RC-Subsystem xxx	El nivel suplementario RC 5 se puede autorizar. Aanvullend RC 5-niveau is toelaatbaar.

D **7. Abgleich analog** | GB **7. Analog adjustments** | F **7. Alignement analogique**

Abgleichfunktionen außerhalb des Service-Mode (= analoge Abgleichpunkte)
Alignment functions outside the Service Mode (= analog alignment points)
Fonctions de alignement en dehors du mode service (points d'alignement analogiques)

	Abgleich **Adjustment** **Alignement**	**Signal** **Signal** **Signal**	**Vorraussetzung** **Condition** **Condition**	**Meßpunkt** **Mst. point** **Point de mes., Indic.**	**Einstellung** **Adjustments** **Réglage**	**Einstellwerte / Besonderheiten** **Settings / special features** **Valeurs de réglage, Particularités**
1	Betriebsspannung Operating voltage Tension de service	Testbild Test pattern Mire	220/230V~	Bildschirm Screen Écran $\boxed{U_B}$	P 662 (Basic Board)	146V ± 0,5V (33") 4:3 142V ± 0,5V (21,24,28") 4:3 136V ± 0,5V Sonstige Ggf. anschließend hor. Amplitude korrigieren! 146V ± 0,5V (33") 4:3 142V ± 0,5V (21,24,28") 14.3 136V ± 0,5V miscellaneous If necessary correct hor. amplitude afterwards! 146V ± 0,5V (33") 4:3 142V ± 0,5V (21,24,28") 4:3 136V ± 0,5V Autres Le cas échéant, corriger ensuite l'amplitude horizontale.
2	Focus Focus Foyer	Testbild Test pattern Mire		Bildschirm Screen Écran	Focus am Zeilentrafo oder Reglereinheit Focus at the line transformer or controller unit Foyer sur le transformteur de balayage horizontal ou unité de réglage!	Optimale Einstellung Optimum settings Réglage optimal

I

7. Allineamento analogici

E

7. Ajuste analógica

NL

7. Afstemming analoog

Funzioni di allineamento fuori della modo di servizio (= punti di allineamento analogici)
Funciones de ajuste fuera del modo Servicio (= puntos de ajuste analógicos)
Afstemmingsfuncties buiten de service mode (= analoge afstemmingspunten)

	Allineamento Ajuste Afstemming	**Segnale Señal Signaal**	**Premesse Requisito Voorwaarde**	**Pto. di mis., Indic. Pto. de medición, indic. Meetpunt**	**Regolazione Ajuste Instelling**	**Particolarita della pos., Valori di pos. Valores de ajuste, observa-ciones Instelwaarden / Bijzonderheden**
1	Tensione d'esercizio Tensión de servicio Bedrijfsspanning	Immagine di prova Carta de ajuste Testbeeld	220/230V~	Schermo Pantalla Beeldscherm $\boxed{U_B}$	P 662 (Basic Board)	146V ± 0,5V (33") 4:3 142V ± 0,5V (21,24,28") 4:3 136V ± 0,5V Altro Correggere eventualmente l'amplitudine orizzontale. 146V ± 0,5V (33") 4:3 142V ± 0,5V (21,24,28") 4:3 136V ± 0,5V Otros Si fuese necesario, corregir seguidamente la amplitud horizontal 146V ± 0,5V (33") 4:3 142V ± 0,5V (21,24,28") 4:3 136V ± 0,5V Overige Evt. aansluitend hor. amplitude corrigeren!
2	Fuoco Foco Focus	Immagine di prova Carta de ajuste Testbeeld		Schermo Pantalla Beeldscherm	Fuoco su trasformatore di riga o unità di regolazione! Foco en transformador de líneas o unidad reguladora Focus bij lijntransformator of regeleenheid	Regolazione ottimale Ajuste óptimo Optimale instelling

Option Byte-Tabelle • Option Byte Table • Tableau Option Byte • Tabella Byte delle Opzioni • Tabla de bytes de opciones • Option Bytes tabel

Abgleichfunktion **Alignement function** **Fonction d'alignement** **Funzione di comp** **Función de ajuste.** **Afstemmingsfuncties**	**Bit-Nr.** **No.** **N°.** **No.** **No.** **Nr.**	**Bedeutung** **Meaning** **Signification** **Significato** **Significación** **Betekenis**	**”0”**	**”1”**	
Byte 0	**0**	Terrestrischer Tuner	BGDK	Multistandard	
	1	EPG Programmfilter EPG Programme filter	**ein** **on**	aus off	
	2	ZAP^{2}TEXT	**nein** **no**	ja yes	
	3	Rotation-Modul Rotations Modul	nein no	ja yes	
	4	LOEWE SYSTEMS-Gerät LOEWE SYSTEMS TV set	nein no	ja yes	
	5	Blaubild ohne Signal Blue picture w/o signal	**ja** **yes**	nein no	
	6	VGA	nein no	ja yes	
	7	TVA	**nein** **no**	ja (nur wenn OPT5/4=1) yes (only if OPT5/4=1)	
Byte 1	**0**	Zeitgest. Progr. Umschaltung Timing program change	**ja** **yes**	nein no	
	1	Sync Slicer VPC	**wird nicht beschrieben** **not described**	wird beschrieben is described	
	2	WSS-Auswertung im VCR-Mode WSS Detection in VCR mode	nein no	**ja** **yes**	
	3	VPC SynchSlicer Pegel im TV-Mode VPC SynchSlicer level in TV mode	**TV-Pegel** **TV level**	VCR-Pegel VCR level	
	4	HMM-Sofort Start (Bank) HMM immediately start	**nein** **no**	ja yes	
	5	OEM Gerät OEM TV set	**nein** **no**	ja yes	
	6	Film-Mode bei TV/DVB Film mode with TV/DVB	gesperrt disabled	**zugelassen** **permitted**	
	7	Bei VGA Synch-Ausfall at VGA mode synch cancellation	Umschaltung in TV-Mode switching to TV mode	**VGA-Mode beibehalten** **keep VGA mode**	
Byte 2	**0**	FLOF	**ein** **on**	aus off	
	1	EPG Erstes Einschalten EPG First use	nein no	ja yes	
	2	Blockier Mode VPC Lock Mode VPC	nein no	**ja** **yes**	
	3	Dunkeltastung beim Umschalten Blanking by switch-over	**nein** **no**	ja yes	
	4	Lautstärkepegel MSP-Ausgang Volume level MSP-output	normal normal	+9dB (HW-Änderung BB) +9dB (HW modification BB)	
	5	AGC memory	aus off	**ein** **on**	
	6	Reaktionszeit auf FB-Befehle Reaction time of remote orders	**schnell** **fast**	langsam slow	
	7	WSS (Wide Screen Signalling Bits)	**ausgewertet** **evaluated**	nicht ausgewertet not evaluated	

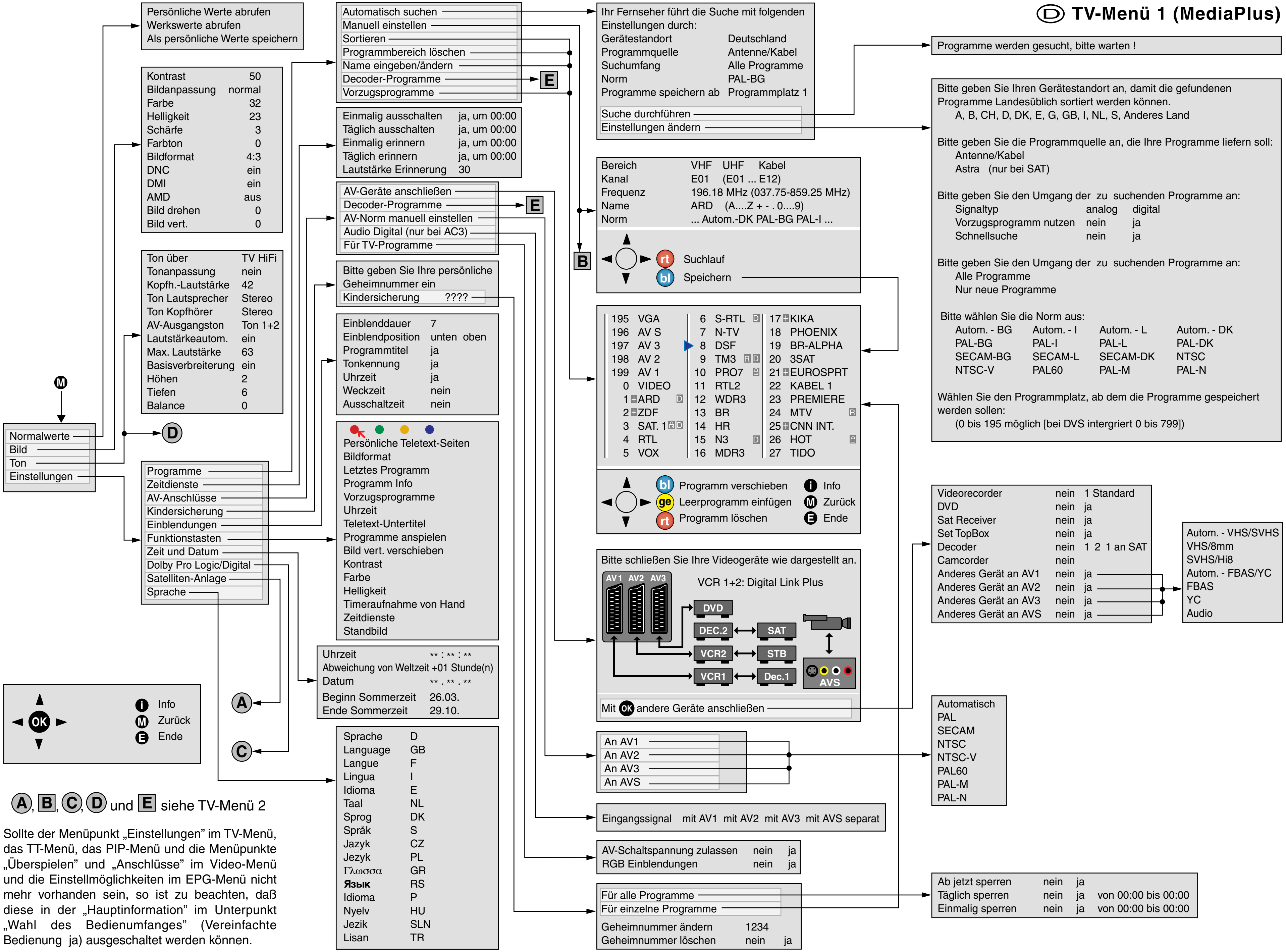
Option Byte-Tabelle • Option Byte Table • Tableau Option Byte • Tabella Byte delle Opzioni • Tabla de bytes de opciones • Option Bytes tabel

Abgleichfunktion Alignement function Fonction d'alignement Funzione di comp Función de ajuste. Afstemmingsfuncties	Bit-Nr. No. N°. No. No. Nr.	Bedeutung Meaning Signification Significato Significación Betekenis	"0"	"1"	
Byte 3	0	Formateinstellung Format setting	**Standardwerte freigegeben** **standard values free**	Standardwerte gesperrt standard values blocked	
	1	Bildröhrenformat Picture tube format	4:3	16:9	
	2	EPG(analog) Nacht-Aktualisierung EPG (analogue) night update switch on delay	aus off	**ein** **on**	
	3	frei free	----	----	
	4	Abschalten nach Programmschluß Switching off after channel closes	**ja** **yes**	nein no	
	5	Fabrikmodus / Tandberg-Monitor Factory Mode / Tandberg-Monitor	aus off	ein oder Tandberg-Monitor on or Tandberg-Monitor	
	6	PIP-Hintergrundfarbe im VGA-Mode PIP background	schwarz black	PIP-Rahmenfarbe PIP frame colour	
	7	Menü "erstes Einschalten" "First use" Menu	nein no	**ja** **yes**	
Byte 4	0	Einschaltverzögerung switch on delay	nein no	**1s nach Regelung ein** **1h after adjustment**	
	1	Autom. Lautstärke Regelung (AVC) Automatic Volume Control (AVC)	**langsam** **slow**	schnell fast	
	2	Abschaltvorhang Power down cycle	**ja** **yes**	nein no	
	3	Dunkeltastung Umschalten DVB Blanking switching to DVB	**nein** **no**	ja yes	
	4	Autom. Filmkennung (AMD) AMD switch-over (AMD)	schnell fast	**langsam** **slow**	
	5	Warmlaufmodus / Tandberg-Monitor Warm-up mode / Tandberg-Monitor	ein oder Tandberg-Monitor on or Tandberg-Monitor	aus off	
	6	Movie Fall Back Mode (BESIC)	**aus** **off**	ein on	
	7	Standbild im VCR Mode "Pause" Freeze frame in VCR mode "Pause"	ja yes	**nein** **no**	
Byte 5	0	SUB 27 Befehle SUB 27 orders	**ausgewertet** **evaluated**	ignoriert ignored	
	1	Seitenumblättern bei EPG (analog) Turning pages with EPG (analogue)	Cursor springt nach unten Cursor jumps to bottom	**Cursor springt nach oben** **Cursor jumps to top**	
	2	50 Hz Progressiv-Darstellung 50 Hz progressive prepresentation	**aus** **off**	ein on	
	3	60 Hz Progressiv-Darstellung 60 Hz progressive prepresentation	aus off	ein on	
	4	HMM-Mode	nein no	ja yes	
	5	EPG Test-Mode EPG test mode	**aus** **off**	ein on	
	6	HMM-Tastatur HMM keyboard	alt old	**neu** **new**	
	7	Idle-Mode in Stand By (ab M2 B11)	**nein** **no**	ja yes	

Option Byte-Tabelle • Option Byte Table • Tableau Option Byte • Tabella Byte delle Opzioni • Tabla de bytes de opciones • Option Bytes tabel

Abgleichfunktion **Alignement function** **Fonction d'alignement** **Funzione di comp** **Función de ajuste.** **Afstemmingsfuncties**	**Bit-Nr.** **No.** **N°.** **No.** **No.** **Nr.**	**Bedeutung** **Meaning** **Signification** **Significato** **Significación** **Betekenis**	**"0"**	**"1"**	
Byte 6	**0**	HDLC	**time out**	no time out	
	1	Klemmverst. RGB-Eingang VPC blank amplifier RGB input VPC	ACh	**A0h**	
	2	Funktion an Port 2.14 (M2 Pin 11) Function at port 2.14 (M2 pin 11)	Tastensperre für TVO Key lock for TVO	Entmagnetisierung Demagnetisation	
	3	EPG RAM Test	**ja** **yes**	nein no	
	4	VT Timeout nach 10 Minuten VT timeout after 10 minutes	**ja** **yes**	nein no	
	5	automat. Einschalten im VT-Modus Automatic switch on in VT mode	**nein** **no**	ja yes	
	6	Indikation des Film-Modes Indication of film mode	**nein** **no**	durch Farbe des Side-Panels by color of the side panel	
	7	VT-Unterseiten Modus "VT subpages mode"	**normal** **normal**	aus out	
Byte 7	**0**	BESIC Version	<V5.2	**>V5.2**	
	1	Ton für HMM-Geräte sound for HMM equipment	**VGA-Ton intern** **VGA sound internal**	VGA-Ton extern VGA sound external	
	2	Suchlauf Search	**normal** **normal**	Test Mode (Feinsuchlauf) test mode (fine search)	
	3	Bevorzugter Tuner (DVB bestückt) preferred tuner (with DVB)	**zus. SAT-Tuner (normal)** **additional SAT tuner (normal)**	Haupt-SAT-Tuner (evtl. für Italien) main SAT tuner (possibly for Italy)	
	4	Auswertung der 16:9-Schaltspannung Assessing the 16:9 switching voltage	**ja** **yes**	nein no	
	5	Bevorzugter Tuner (ohne DVB) preferred tuner (without DVB)	**Haupt-SAT-Tuner (normal)** **main SAT tuner (normal)**	zus. SAT-Tuner (keine Tonstörungen) additional SAT tuner (no sound impairment)	
	6	AV2-Monitor für C-Box AV2 monitor for C-Box	**gesperrt** **blocked**	freigegeben enabled	
	7	ext. HF-Sender für Ton ext. HF transmitter for sound	**ja** **yes**	nein no	
Byte 8	**0**	Fabrikmodus Factory Mode	**nein** **no**	ja yes	
	1	Klinkenstecker Audio-in Jack plug Audio In	nicht bestückt without	bestückt with	
	2	Frontbuchse Front socket	bestückt with	nicht bestückt without	
	3	Dynam. Bass (MICRONAS)	**aus** **out**	ein on	
	4	75 Hz Interlace-Darstellung 75 Hz interface representation	**aus** **out**	ein on	
	5	Blue Stretch	**aus** **out**	ein on	
	6	Black Stretch	**aus** **out**	ein on	
	7	Auto. Wiedereinschalten (Warm Up) Auto on (warm up)	**aus** **out**	ein on	

Ⓓ TV-Menü 1 (MediaPlus)



Normalwerte
Bild
Ton
Einstellungen

Persönliche Werte abrufen
Werkswerte abrufen
Als persönliche Werte speichern

Kontrast	50
Bildanpassung	normal
Farbe	32
Helligkeit	23
Schärfe	3
Farbton	0
Bildformat	4:3
DNC	ein
DMI	ein
AMD	aus
Bild drehen	0
Bild vert.	0

Ton über	TV HiFi
Tonanpassung	nein
Kopfh.-Lautstärke	42
Ton Lautsprecher	Stereo
Ton Kopfhörer	Stereo
AV-Ausgangston	Ton 1+2
Lautstärkeautom.	ein
Max. Lautstärke	63
Basisverbreiterung	ein
Höhen	2
Tiefen	6
Balance	0

Programme
Zeitdienste
AV-Anschlüsse
Kindersicherung
Einblendungen
Funktionstasten
Zeit und Datum
Dolby Pro Logic/Digital
Satelliten-Anlage
Sprache

Automatisch suchen
Manuell einstellen
Sortieren
Programmbereich löschen
Name eingeben/ändern
Decoder-Programme Ⓔ
Vorzugsprogramme

Ihr Fernseher führt die Suche mit folgenden Einstellungen durch:

Gerätestandort	Deutschland
Programmquelle	Antenne/Kabel
Suchumfang	Alle Programme
Norm	PAL-BG
Programme speichern ab	Programmplatz 1

Suche durchführen
Einstellungen ändern

Programme werden gesucht, bitte warten !

Bitte geben Sie Ihren Gerätestandort an, damit die gefundenen Programme Landesüblich sortiert werden können.
A, B, CH, D, DK, E, G, GB, I, NL, S, Anderes Land

Bitte geben Sie die Programmquelle an, die Ihre Programme liefern soll:
Antenne/Kabel
Astra (nur bei SAT)

Bitte geben Sie den Umgang der zu suchenden Programme an:

Signaltyp	analog	digital
Vorzugsprogramm nutzen	nein	ja
Schnellsuche	nein	ja

Bitte geben Sie den Umgang der zu suchenden Programme an:
Alle Programme
Nur neue Programme

Bitte wählen Sie die Norm aus:

Autom. - BG	Autom. - I	Autom. - L	Autom. - DK
PAL-BG	PAL-I	PAL-L	PAL-DK
SECAM-BG	SECAM-L	SECAM-DK	NTSC
NTSC-V	PAL60	PAL-M	PAL-N

Wählen Sie den Programmplatz, ab dem die Programme gespeichert werden sollen:
(0 bis 195 möglich [bei DVS intergriert 0 bis 799])

Einmalig ausschalten	ja, um 00:00
Täglich ausschalten	ja, um 00:00
Einmalig erinnern	ja, um 00:00
Täglich erinnern	ja, um 00:00
Lautstärke Erinnerung	30

Bereich	VHF UHF Kabel
Kanal	E01 (E01 ... E12)
Frequenz	196.18 MHz (037.75-859.25 MHz)
Name	ARD (A....Z + - . 0....9)
Norm	... Autom.-DK PAL-BG PAL-I ...

rt Suchlauf
bl Speichern

AV-Geräte anschließen
Decoder-Programme Ⓔ
AV-Norm manuell einstellen
Audio Digital (nur bei AC3)
Für TV-Programme

Bitte geben Sie Ihre persönliche Geheimnummer ein
Kindersicherung ????

195	VGA	6	S-RTL D	17	+ KIKA
196	AV S	7	N-TV	18	PHOENIX
197	AV 3	▶ 8	DSF	19	BR-ALPHA
198	AV 2	9	TM3 R D	20	3SAT
199	AV 1	10	PRO7 🔒	21	+ EUROSPRT
0	VIDEO	11	RTL2	22	KABEL 1
1	+ ARD D	12	WDR3	23	PREMIERE
2	+ ZDF	13	BR	24	MTV R
3	SAT. 1 🔒 D	14	HR	25	+ CNN INT.
4	RTL	15	N3 D	26	HOT 🔒
5	VOX	16	MDR3	27	TIDO

bl Programm verschieben
ge Leerprogramm einfügen
rt Programm löschen
ⓘ Info
Ⓜ Zurück
Ⓔ Ende

Einblenddauer	7
Einblendposition	unten oben
Programmtitel	ja
Tonkennung	ja
Uhrzeit	ja
Weckzeit	nein
Ausschaltzeit	nein

● ● ● ●
Persönliche Teletext-Seiten
Bildformat
Letztes Programm
Programm Info
Vorzugsprogramme
Uhrzeit
Teletext-Untertitel
Programme anspielen
Bild vert. verschieben
Kontrast
Farbe
Helligkeit
Timeraufnahme von Hand
Zeitdienste
Standbild

Bitte schließen Sie Ihre Videogeräte wie dargestellt an.
VCR 1+2: Digital Link Plus
Mit OK andere Geräte anschließen

Videorecorder	nein	1 Standard
DVD	nein	ja
Sat Receiver	nein	ja
Set TopBox	nein	ja
Decoder	nein	1 2 1 an SAT
Camcorder	nein	
Anderes Gerät an AV1	nein	ja
Anderes Gerät an AV2	nein	ja
Anderes Gerät an AV3	nein	ja
Anderes Gerät an AVS	nein	ja

Autom. - VHS/SVHS
VHS/8mm
SVHS/Hi8
Autom. - FBAS/YC
FBAS
YC
Audio

Uhrzeit	** : ** : **
Abweichung von Weltzeit	+01 Stunde(n)
Datum	** . ** . **
Beginn Sommerzeit	26.03.
Ende Sommerzeit	29.10.

An AV1
An AV2
An AV3
An AVS

Automatisch
PAL
SECAM
NTSC
NTSC-V
PAL60
PAL-M
PAL-N

Eingangssignal mit AV1 mit AV2 mit AV3 mit AVS separat

AV-Schaltspannung zulassen	nein	ja
RGB Einblendungen	nein	ja

Für alle Programme
Für einzelne Programme

Geheimnummer ändern	1234	
Geheimnummer löschen	nein	ja

Ab jetzt sperren	nein	ja	
Täglich sperren	nein	ja	von 00:00 bis 00:00
Einmalig sperren	nein	ja	von 00:00 bis 00:00

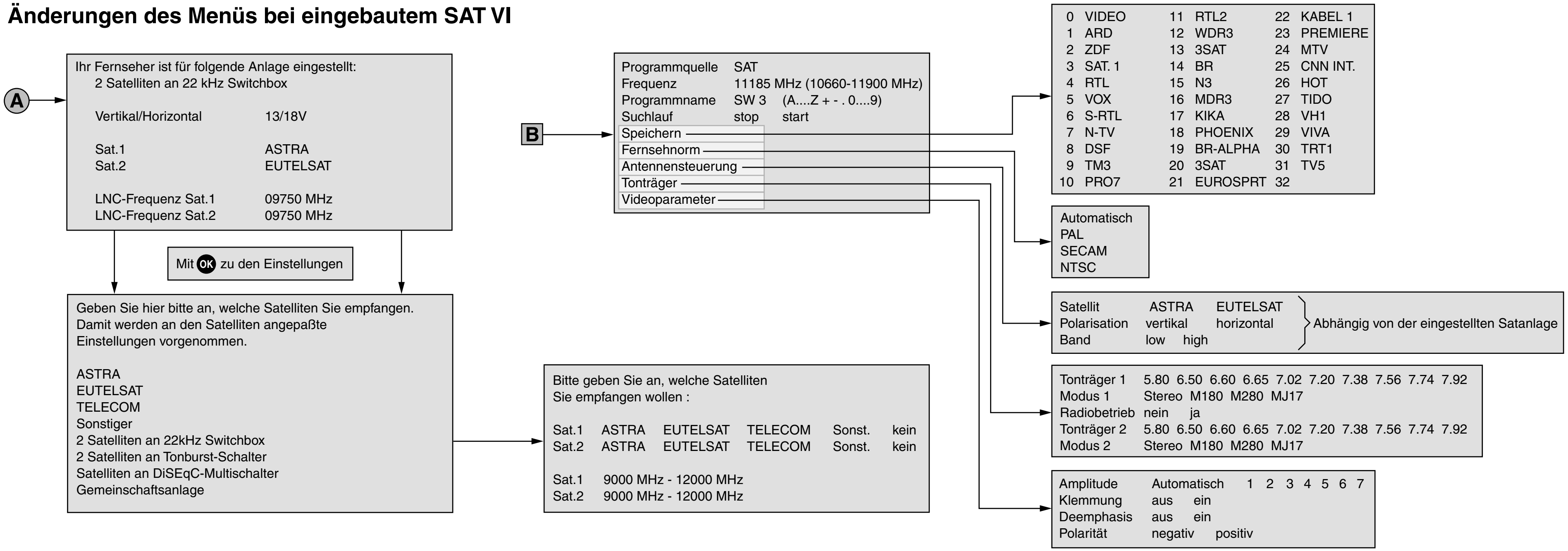
Sprache	D
Language	GB
Langue	F
Lingua	I
Idioma	E
Taal	NL
Sprog	DK
Språk	S
Jazyk	CZ
Jezyk	PL
Γλωσσα	GR
Язык	RS
Idioma	P
Nyelv	HU
Jezik	SLN
Lisan	TR

OK
ⓘ Info
Ⓜ Zurück
Ⓔ Ende

Ⓐ, Ⓑ, Ⓒ, Ⓓ und Ⓔ siehe TV-Menü 2

Sollte der Menüpunkt „Einstellungen" im TV-Menü, das TT-Menü, das PIP-Menü und die Menüpunkte „Überspielen" und „Anschlüsse" im Video-Menü und die Einstellmöglichkeiten im EPG-Menü nicht mehr vorhanden sein, so ist zu beachten, daß diese in der „Hauptinformation" im Unterpunkt „Wahl des Bedienumfanges" (Vereinfachte Bedienung ja) ausgeschaltet werden können.

Änderungen des Menüs bei eingebautem SAT VI



A

Ihr Fernseher ist für folgende Anlage eingestellt:
2 Satelliten an 22 kHz Switchbox

Vertikal/Horizontal	13/18V
Sat.1	ASTRA
Sat.2	EUTELSAT
LNC-Frequenz Sat.1	09750 MHz
LNC-Frequenz Sat.2	09750 MHz

Mit OK zu den Einstellungen

Geben Sie hier bitte an, welche Satelliten Sie empfangen.
Damit werden an den Satelliten angepaßte
Einstellungen vorgenommen.

ASTRA
EUTELSAT
TELECOM
Sonstiger
2 Satelliten an 22kHz Switchbox
2 Satelliten an Tonburst-Schalter
Satelliten an DiSEqC-Multischalter
Gemeinschaftsanlage

Bitte geben Sie an, welche Satelliten
Sie empfangen wollen :

Sat.1	ASTRA	EUTELSAT	TELECOM	Sonst.	kein
Sat.2	ASTRA	EUTELSAT	TELECOM	Sonst.	kein

Sat.1 9000 MHz - 12000 MHz
Sat.2 9000 MHz - 12000 MHz

B

Programmquelle	SAT
Frequenz	11185 MHz (10660-11900 MHz)
Programmname	SW 3 (A....Z + - . 0....9)
Suchlauf	stop start
Speichern	
Fernsehnorm	
Antennensteuerung	
Tonträger	
Videoparameter	

0	VIDEO	11	RTL2	22	KABEL 1
1	ARD	12	WDR3	23	PREMIERE
2	ZDF	13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

Automatisch
PAL
SECAM
NTSC

Satellit	ASTRA	EUTELSAT
Polarisation	vertikal	horizontal
Band	low	high

Abhängig von der eingestellten Satanlage

Tonträger 1	5.80 6.50 6.60 6.65 7.02 7.20 7.38 7.56 7.74 7.92
Modus 1	Stereo M180 M280 MJ17
Radiobetrieb	nein ja
Tonträger 2	5.80 6.50 6.60 6.65 7.02 7.20 7.38 7.56 7.74 7.92
Modus 2	Stereo M180 M280 MJ17

Amplitude	Automatisch 1 2 3 4 5 6 7
Klemmung	aus ein
Deemphasis	aus ein
Polarität	negativ positiv

Änderungen des Menüs bei eingeschaltetem Dolby Decoder

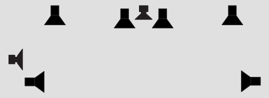
D

Ton über	TV HiFi-Anlage			
Ton Decoder	ein			
Hörmodus	Surround			
Tonanpassung	nein	Pop	Klassik	Sprache
Kopfh.-Lautstärke	42			
Ton Lautsprecher	Mono	Mono !		
Ton Kopfhörer	Mono	Mono !		
AV-Ausgangston	Ton 1	Ton 2	Ton 1+2	
Lautst.-Automatik	aus	ein		
Max. Lautstärke	63			
Höhen	4			
Tiefen	6			

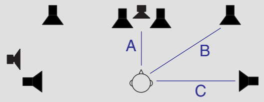
C

Lautsprecher anschließen
Hörer/Lautspr. Entfernungen
Lautsprecher einpegeln

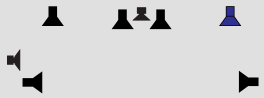
Ext. Frontlautsprecher	nein	small	large
Surround Lautsprecher	nein	small	large
Ext. Subwoofer	nein	ja	
Woofer	nein	ja	



Abstand A	0.7 m
Abstand B	0.7 m
Abstand C	0.7 m



Lautsprecher Einpegeln 0



Änderungen des Menüs bei angeschlossenem Decoder

E

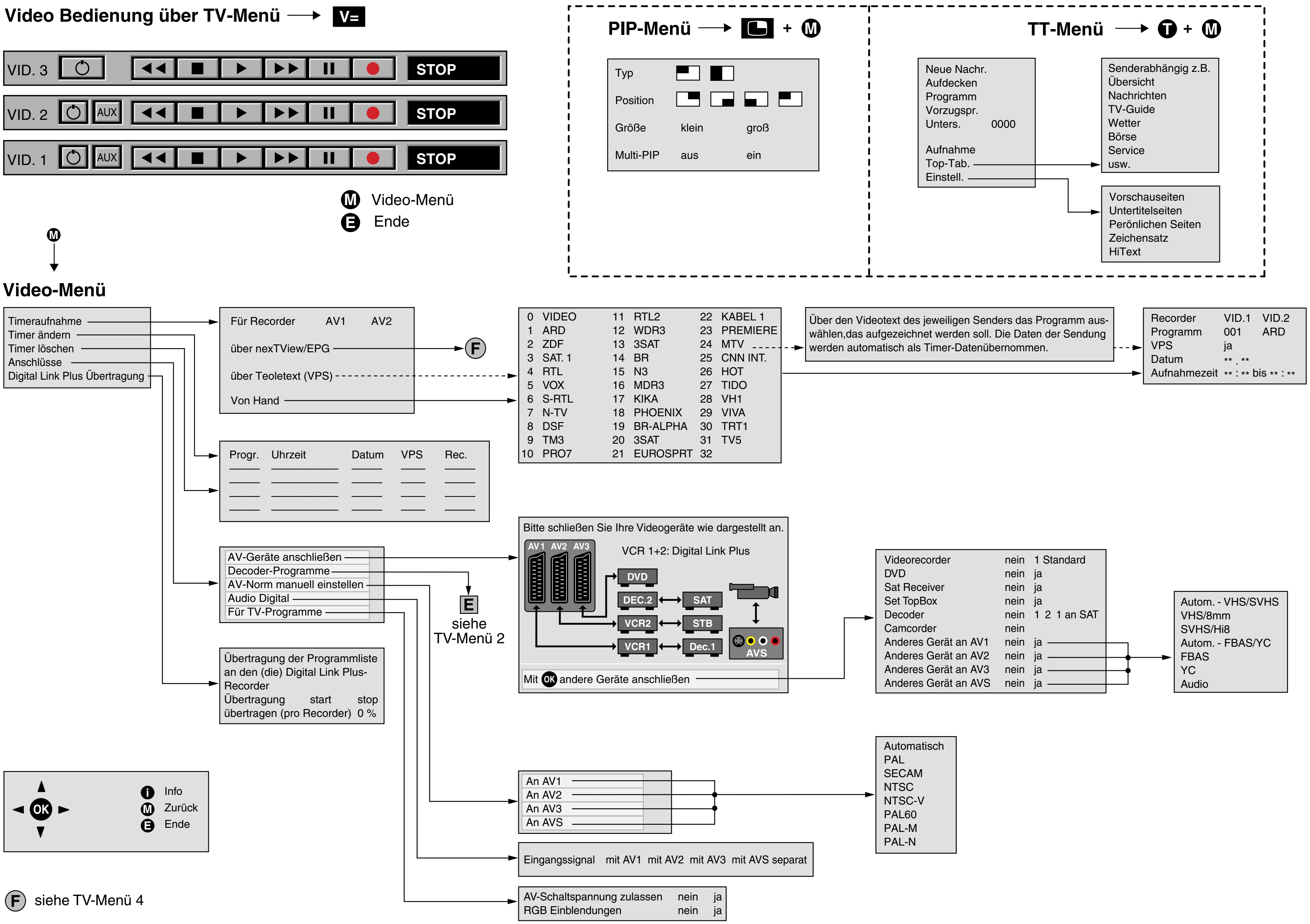
Für Decoder an AV1
Für Decoder an AV2

Ton von AV-Buchse 1	Decoder	TV	Autom.
Ton von AV-Buchse 2	Decoder	TV	Autom.

0	VIDEO	11	RTL2	22	KABEL 1
1	ARD	12	WDR3	23	PREMIERE
2	ZDF	13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

Decoder Programm markieren und mit OK festlegen

Ⓓ TV-Menü 3 (MediaPlus)



Video Bedienung über TV-Menü → V=

Ⓜ Video-Menü
Ⓔ Ende

PIP-Menü → + Ⓜ

Typ				
Position				
Größe	klein	groß		
Multi-PIP	aus	ein		

TT-Menü → Ⓣ + Ⓜ

Neue Nachr.
Aufdecken
Programm
Vorzugspr.
Unters. 0000

Aufnahme
Top-Tab.
Einstell.

Senderabhängig z.B.
Übersicht
Nachrichten
TV-Guide
Wetter
Börse
Service
usw.

Vorschauseiten
Untertitelseiten
Perönlichen Seiten
Zeichensatz
HiText

Video-Menü

Timeraufnahme
Timer ändern
Timer löschen
Anschlüsse
Digital Link Plus Übertragung

Für Recorder	AV1	AV2
über nexTView/EPG	Ⓕ	
über Teoletext (VPS)		
Von Hand		

0 VIDEO	11 RTL2	22 KABEL 1
1 ARD	12 WDR3	23 PREMIERE
2 ZDF	13 3SAT	24 MTV
3 SAT. 1	14 BR	25 CNN INT.
4 RTL	15 N3	26 HOT
5 VOX	16 MDR3	27 TIDO
6 S-RTL	17 KIKA	28 VH1
7 N-TV	18 PHOENIX	29 VIVA
8 DSF	19 BR-ALPHA	30 TRT1
9 TM3	20 3SAT	31 TV5
10 PRO7	21 EUROSPRT	32

Über den Videotext des jeweiligen Senders das Programm auswählen,das aufgezeichnet werden soll. Die Daten der Sendung werden automatisch als Timer-Datenübernommen.

Recorder	VID.1	VID.2
Programm	001	ARD
VPS	ja	
Datum	** . **	
Aufnahmezeit	** : ** bis ** : **	

Progr.	Uhrzeit	Datum	VPS	Rec.
____	________	____	___	____
____	________	____	___	____
____	________	____	___	____
____	________	____	___	____

AV-Geräte anschließen
Decoder-Programme
AV-Norm manuell einstellen
Audio Digital
Für TV-Programme

Ⓔ
siehe
TV-Menü 2

Übertragung der Programmliste an den (die) Digital Link Plus-Recorder
Übertragung start stop
übertragen (pro Recorder) 0 %

Bitte schließen Sie Ihre Videogeräte wie dargestellt an.

VCR 1+2: Digital Link Plus

Mit OK andere Geräte anschließen

Videorecorder	nein	1 Standard
DVD	nein	ja
Sat Receiver	nein	ja
Set TopBox	nein	ja
Decoder	nein	1 2 1 an SAT
Camcorder	nein	
Anderes Gerät an AV1	nein	ja
Anderes Gerät an AV2	nein	ja
Anderes Gerät an AV3	nein	ja
Anderes Gerät an AVS	nein	ja

Autom. - VHS/SVHS
VHS/8mm
SVHS/Hi8
Autom. - FBAS/YC
FBAS
YC
Audio

An AV1
An AV2
An AV3
An AVS

Automatisch
PAL
SECAM
NTSC
NTSC-V
PAL60
PAL-M
PAL-N

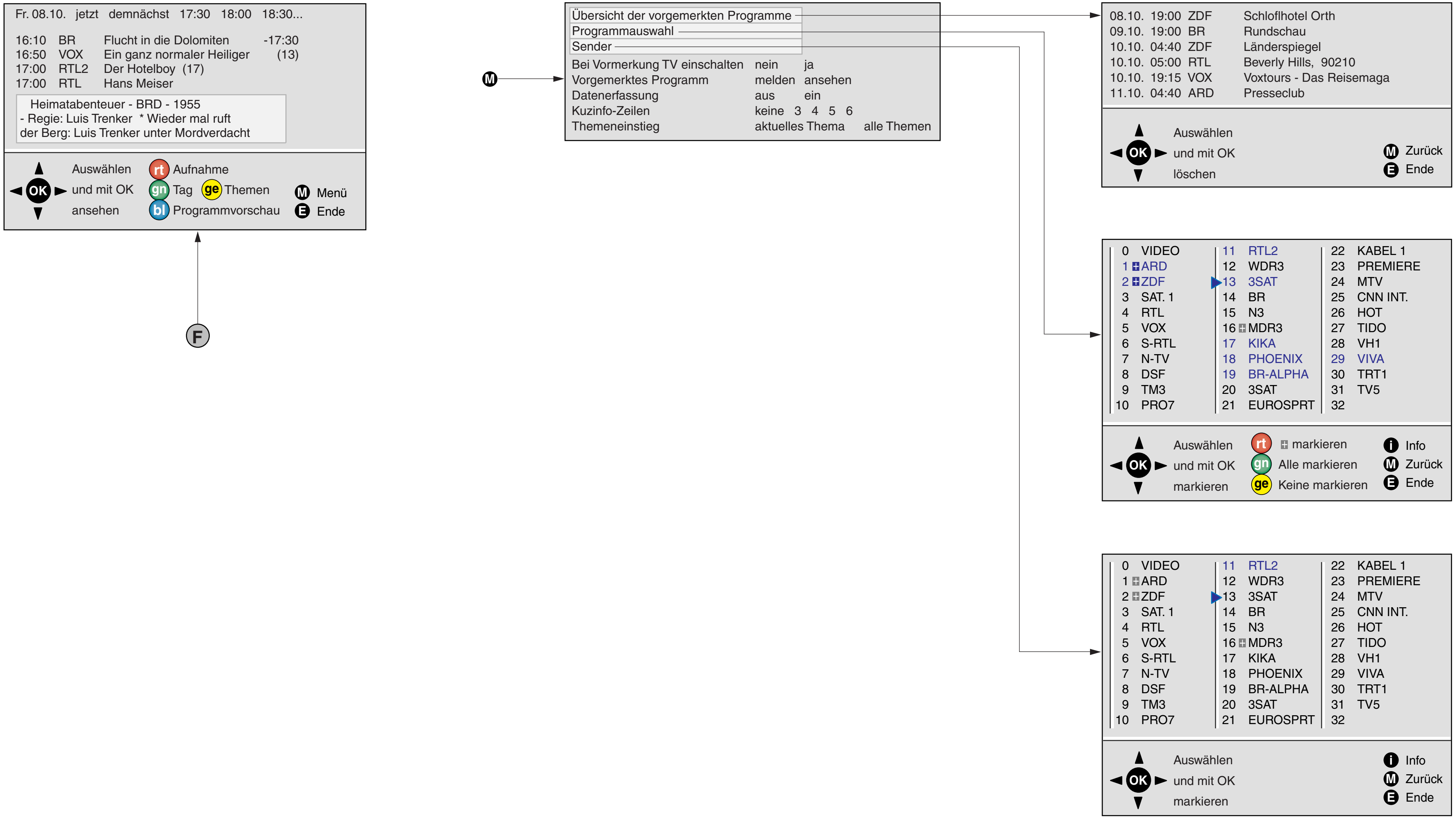
Eingangssignal mit AV1 mit AV2 mit AV3 mit AVS separat

AV-Schaltspannung zulassen	nein	ja
RGB Einblendungen	nein	ja

Ⓘ Info
Ⓜ Zurück
Ⓔ Ende

Ⓕ siehe TV-Menü 4

nexTView Menü: (Taste nexTView bzw. EPG auf der Fernbedienung)


M
F

Fr. 08.10. jetzt demnächst 17:30 18:00 18:30...

16:10	BR	Flucht in die Dolomiten	-17:30
16:50	VOX	Ein ganz normaler Heiliger	(13)
17:00	RTL2	Der Hotelboy (17)	
17:00	RTL	Hans Meiser	

Heimatabenteuer - BRD - 1955
- Regie: Luis Trenker * Wieder mal ruft
der Berg: Luis Trenker unter Mordverdacht

OK
Auswählen
und mit OK
ansehen
rt Aufnahme
gn Tag
ge Themen
bl Programmvorschau
M Menü
E Ende

Übersicht der vorgemerkten Programme
Programmauswahl
Sender
Bei Vormerkung TV einschalten nein ja
Vorgemerktes Programm melden ansehen
Datenerfassung aus ein
Kuzinfo-Zeilen keine 3 4 5 6
Themeneinstieg aktuelles Thema alle Themen

08.10.	19:00	ZDF	Schloflhotel Orth
09.10.	19:00	BR	Rundschau
10.10.	04:40	ZDF	Länderspiegel
10.10.	05:00	RTL	Beverly Hills, 90210
10.10.	19:15	VOX	Voxtours - Das Reisemaga
11.10.	04:40	ARD	Presseclub

OK
Auswählen
und mit OK
löschen
M Zurück
E Ende

0	VIDEO	11	RTL2	22	KABEL 1
1	⊞ARD	12	WDR3	23	PREMIERE
2	⊞ZDF	▶13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	⊞MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

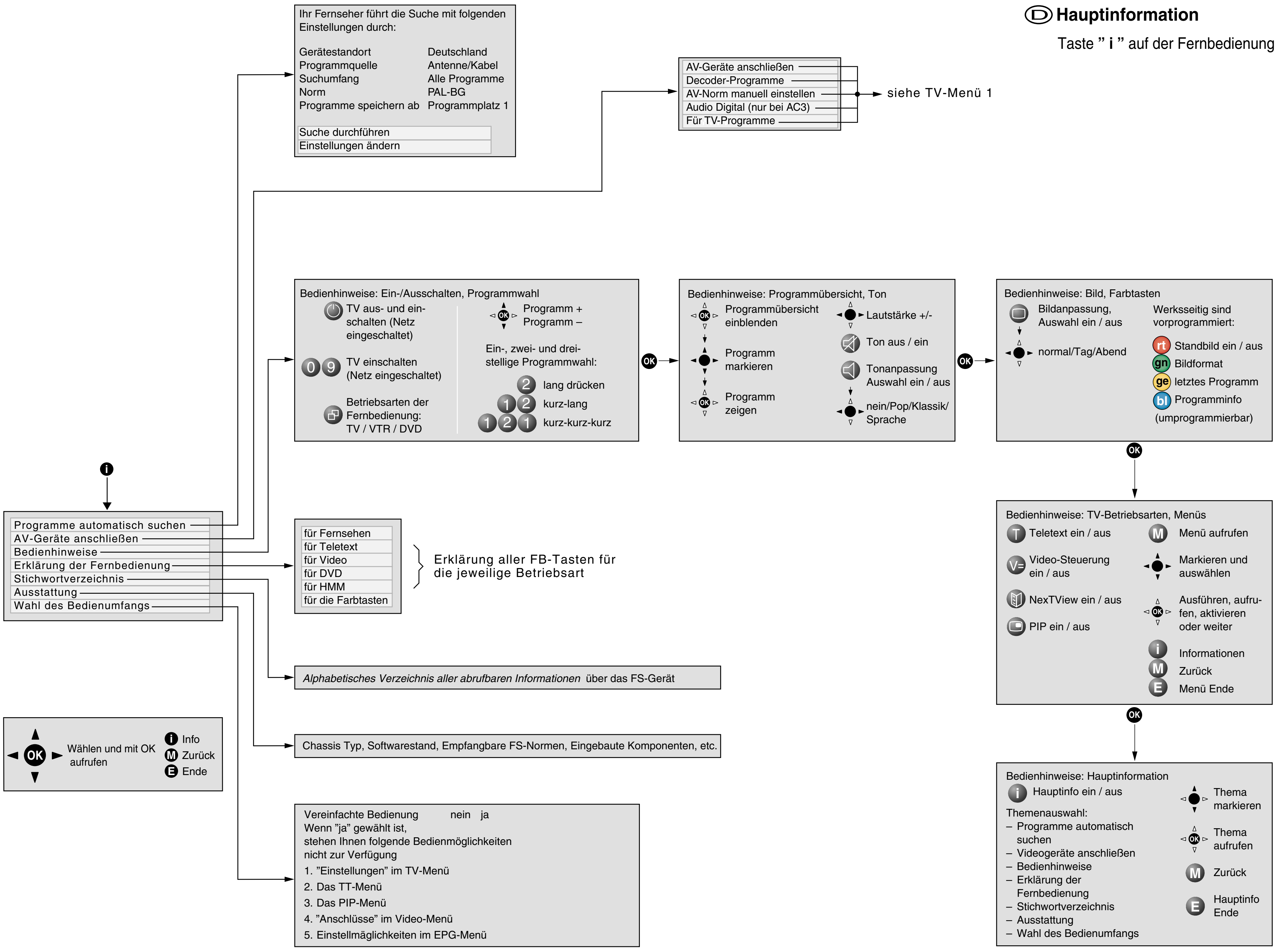
OK
Auswählen
und mit OK
markieren
rt ⊞ markieren
gn Alle markieren
ge Keine markieren
i Info
M Zurück
E Ende

0	VIDEO	11	RTL2	22	KABEL 1
1	⊞ARD	12	WDR3	23	PREMIERE
2	⊞ZDF	▶13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	⊞MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

OK
Auswählen
und mit OK
markieren
i Info
M Zurück
E Ende

Ⓓ Hauptinformation

Taste ” i ” auf der Fernbedienung



i

- Programme automatisch suchen
- AV-Geräte anschließen
- Bedienhinweise
- Erklärung der Fernbedienung
- Stichwortverzeichnis
- Ausstattung
- Wahl des Bedienumfangs

▲ ◄ OK ► ▼ Wählen und mit OK aufrufen
i Info
M Zurück
E Ende

Ihr Fernseher führt die Suche mit folgenden Einstellungen durch:

Gerätestandort	Deutschland
Programmquelle	Antenne/Kabel
Suchumfang	Alle Programme
Norm	PAL-BG
Programme speichern ab	Programmplatz 1

- Suche durchführen
- Einstellungen ändern

- AV-Geräte anschließen
- Decoder-Programme
- AV-Norm manuell einstellen
- Audio Digital (nur bei AC3)
- Für TV-Programme

→ siehe TV-Menü 1

Bedienhinweise: Ein-/Ausschalten, Programmwahl

TV aus- und einschalten (Netz eingeschaltet)

0 9 TV einschalten (Netz eingeschaltet)

Betriebsarten der Fernbedienung: TV / VTR / DVD

OK Programm + Programm –

Ein-, zwei- und dreistellige Programmwahl:

2 lang drücken

1 2 kurz-lang

1 2 1 kurz-kurz-kurz

OK →

Bedienhinweise: Programmübersicht, Ton

OK Programmübersicht einblenden

Programm markieren

OK Programm zeigen

Lautstärke +/-

Ton aus / ein

Tonanpassung Auswahl ein / aus

nein/Pop/Klassik/ Sprache

OK →

Bedienhinweise: Bild, Farbtasten

Bildanpassung, Auswahl ein / aus

normal/Tag/Abend

Werksseitig sind vorprogrammiert:

rt Standbild ein / aus

gn Bildformat

ge letztes Programm

bl Programminfo

(unprogrammierbar)

OK ↓

Bedienhinweise: TV-Betriebsarten, Menüs

T Teletext ein / aus

V= Video-Steuerung ein / aus

NexTView ein / aus

PIP ein / aus

M Menü aufrufen

Markieren und auswählen

OK Ausführen, aufrufen, aktivieren oder weiter

i Informationen

M Zurück

E Menü Ende

OK ↓

Bedienhinweise: Hauptinformation

i Hauptinfo ein / aus

Themenauswahl:
- Programme automatisch suchen
- Videogeräte anschließen
- Bedienhinweise
- Erklärung der Fernbedienung
- Stichwortverzeichnis
- Ausstattung
- Wahl des Bedienumfangs

Thema markieren

OK Thema aufrufen

M Zurück

E Hauptinfo Ende

- für Fernsehen
- für Teletext
- für Video
- für DVD
- für HMM
- für die Farbtasten

} Erklärung aller FB-Tasten für die jeweilige Betriebsart

Alphabetisches Verzeichnis aller abrufbaren Informationen über das FS-Gerät

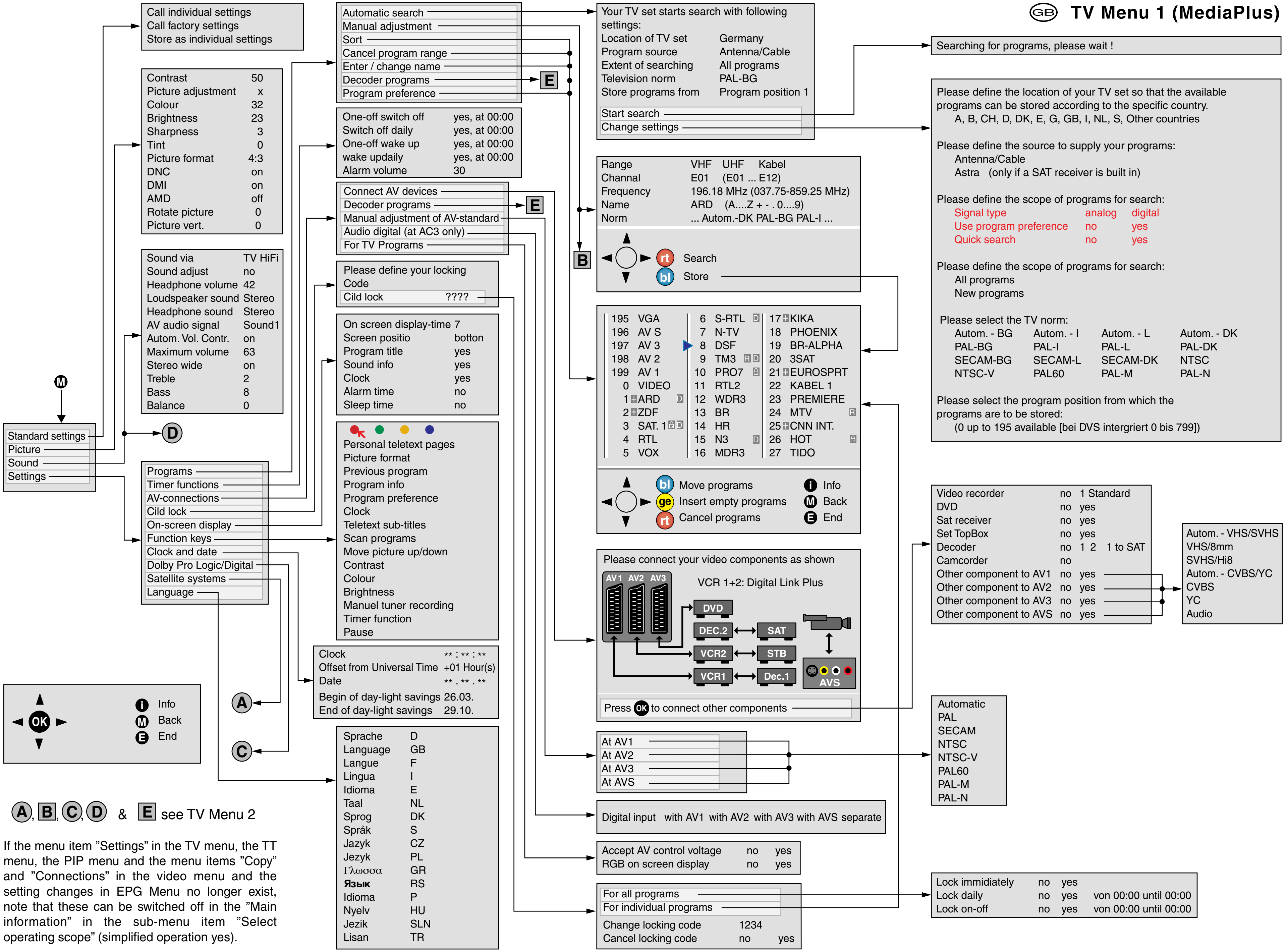
Chassis Typ, Softwarestand, Empfangbare FS-Normen, Eingebaute Komponenten, etc.

Vereinfachte Bedienung nein ja

Wenn ”ja” gewählt ist, stehen Ihnen folgende Bedienmöglichkeiten nicht zur Verfügung

1. ”Einstellungen” im TV-Menü
2. Das TT-Menü
3. Das PIP-Menü
4. ”Anschlüsse” im Video-Menü
5. Einstellmäglichkeiten im EPG-Menü

GB TV Menu 1 (MediaPlus)



Standard settings
Picture
Sound
Settings

Call individual settings
Call factory settings
Store as individual settings

Contrast	50
Picture adjustment	x
Colour	32
Brightness	23
Sharpness	3
Tint	0
Picture format	4:3
DNC	on
DMI	on
AMD	off
Rotate picture	0
Picture vert.	0

Sound via	TV HiFi
Sound adjust	no
Headphone volume	42
Loudspeaker sound	Stereo
Headphone sound	Stereo
AV audio signal	Sound1
Autom. Vol. Contr.	on
Maximum volume	63
Stereo wide	on
Treble	2
Bass	8
Balance	0

Programs
Timer functions
AV-connections
Cild lock
On-screen display
Function keys
Clock and date
Dolby Pro Logic/Digital
Satellite systems
Language

OK
i Info
M Back
E End

Automatic search
Manual adjustment
Sort
Cancel program range
Enter / change name
Decoder programs
Program preference

One-off switch off	yes, at 00:00
Switch off daily	yes, at 00:00
One-off wake up	yes, at 00:00
wake updaily	yes, at 00:00
Alarm volume	30

Connect AV devices
Decoder programs
Manual adjustment of AV-standard
Audio digital (at AC3 only)
For TV Programs

Please define your locking
Code
Cild lock ????

On screen display-time	7
Screen positio	botton
Program title	yes
Sound info	yes
Clock	yes
Alarm time	no
Sleep time	no

● ● ● ●
Personal teletext pages
Picture format
Previous program
Program info
Program preference
Clock
Teletext sub-titles
Scan programs
Move picture up/down
Contrast
Colour
Brightness
Manuel tuner recording
Timer function
Pause

Clock	** : ** : **
Offset from Universal Time	+01 Hour(s)
Date	** . ** . **
Begin of day-light savings	26.03.
End of day-light savings	29.10.

Sprache	D
Language	GB
Langue	F
Lingua	I
Idioma	E
Taal	NL
Sprog	DK
Språk	S
Jazyk	CZ
Jezyk	PL
Γλωσσα	GR
Язык	RS
Idioma	P
Nyelv	HU
Jezik	SLN
Lisan	TR

Your TV set starts search with following settings:

Location of TV set	Germany
Program source	Antenna/Cable
Extent of searching	All programs
Television norm	PAL-BG
Store programs from	Program position 1

Start search
Change settings

Range	VHF	UHF	Kabel
Channal	E01	(E01 ... E12)	
Frequency	196.18 MHz (037.75-859.25 MHz)		
Name	ARD	(A....Z + - . 0....9)	
Norm	... Autom.-DK PAL-BG PAL-I ...		

rt Search
bl Store

195	VGA	6	S-RTL	17	KIKA
196	AV S	7	N-TV	18	PHOENIX
197	AV 3	▶ 8	DSF	19	BR-ALPHA
198	AV 2	9	TM3	20	3SAT
199	AV 1	10	PRO7	21	EUROSPRT
0	VIDEO	11	RTL2	22	KABEL 1
1	ARD	12	WDR3	23	PREMIERE
2	ZDF	13	BR	24	MTV
3	SAT. 1	14	HR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	MDR3	27	TIDO

bl Move programs
ge Insert empty programs
rt Cancel programs
i Info
M Back
E End

Please connect your video components as shown
VCR 1+2: Digital Link Plus
Press OK to connect other components

At AV1
At AV2
At AV3
At AVS

Digital input with AV1 with AV2 with AV3 with AVS separate

Accept AV control voltage	no	yes
RGB on screen display	no	yes

For all programs
For individual programs

Change locking code	1234	
Cancel locking code	no	yes

Searching for programs, please wait !

Please define the location of your TV set so that the available programs can be stored according to the specific country.
A, B, CH, D, DK, E, G, GB, I, NL, S, Other countries

Please define the source to supply your programs:
Antenna/Cable
Astra (only if a SAT receiver is built in)

Please define the scope of programs for search:

Signal type	analog	digital
Use program preference	no	yes
Quick search	no	yes

Please define the scope of programs for search:
All programs
New programs

Please select the TV norm:

Autom. - BG	Autom. - I	Autom. - L	Autom. - DK
PAL-BG	PAL-I	PAL-L	PAL-DK
SECAM-BG	SECAM-L	SECAM-DK	NTSC
NTSC-V	PAL60	PAL-M	PAL-N

Please select the program position from which the programs are to be stored:
(0 up to 195 available [bei DVS intergriert 0 bis 799])

Video recorder	no	1 Standard		
DVD	no	yes		
Sat receiver	no	yes		
Set TopBox	no	yes		
Decoder	no	1	2	1 to SAT
Camcorder	no			
Other component to AV1	no	yes		
Other component to AV2	no	yes		
Other component to AV3	no	yes		
Other component to AVS	no	yes		

Autom. - VHS/SVHS
VHS/8mm
SVHS/Hi8
Autom. - CVBS/YC
CVBS
YC
Audio

Automatic
PAL
SECAM
NTSC
NTSC-V
PAL60
PAL-M
PAL-N

Lock immidiately	no	yes	
Lock daily	no	yes	von 00:00 until 00:00
Lock on-off	no	yes	von 00:00 until 00:00

A, B, C, D & E see TV Menu 2

If the menu item ”Settings” in the TV menu, the TT menu, the PIP menu and the menu items ”Copy” and ”Connections” in the video menu and the setting changes in EPG Menu no longer exist, note that these can be switched off in the ”Main information” in the sub-menu item ”Select operating scope” (simplified operation yes).

Changes to the menu with installed SAT VI

A

Your TV set is adjusted to the following system:
2 satellites at 22 kHz switchbox

Vertikal/horizontal	13/18V
Sat.1	ASTRA
Sat.2	EUTELSAT
LNC-frequency Sat.1	09750 MHz
LNC-frequency Sat.2	09750 MHz

Press OK to change settings

Please define which satellite you receive.
The settings are then adjusted to your satellite.

ASTRA
EUTELSAT
TELECOM
others
2 satellites at 22kHz switchbox
2 satellites at toneburst switch
Satellites at DiSEqC-multipli-switch
Common satellite system

Please define which satellites you want to receive:

Sat.1	ASTRA	EUTELSAT	TELECOM	Others	none
Sat.2	ASTRA	EUTELSAT	TELECOM	Others	none

Sat.1	9000 MHz - 12000 MHz
Sat.2	9000 MHz - 12000 MHz

B

Program source	SAT	
Frequency	11185 MHz (10660-11900 MHz)	
Program name	SW 3	(A....Z + - . 0....9)
Automatic search	stop	start

Store
TV norm
Antenna control
Sound carrierr
Video parameters

0	VIDEO	11	RTL2	22	KABEL 1
1	ARD	12	WDR3	23	PREMIERE
2	ZDF	13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

Automatic
PAL
SECAM
NTSC

Satellite	ASTRA	EUTELSAT	depends on select Satellite system
Polarisation	vertikal	horizontal	
Band	low	high	

Sound carrier 1	5.80 6.50 6.60 6.65 7.02 7.20 7.38 7.56 7.74 7.92
Mode 1	Stereo M180 M280 MJ17
Radio mode	no yes
Sound carrier 2	5.80 6.50 6.60 6.65 7.02 7.20 7.38 7.56 7.74 7.92
Mode 2	Stereo M180 M280 MJ17

Amplitude	Automatic	1 2 3 4 5 6 7
Clemping	off	on
Deemphasis	off	on
Polarity	negativ	positive

Changes to the menu with connected Dolby decoder

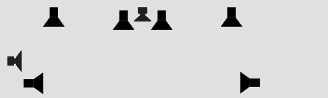
D

Sound via	TV HiFi			
Sound decoder	on			
Listening mode	Surround			
Sound adjust	no	Pop	Classical	Speech
Headphone volume	42			
Loudspeaker sound	Mono	Mono !		
Headphone sound	Mono	Mono !		
AV audio signal	Sound 1	Sound 2	Sound 1+2	
Autom. Vol. Contr.	off	on		
Maximum volume	63			
Treble	4			
Bass	6			

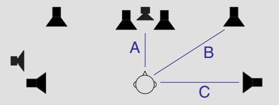
C

Connect speakers
Listener-speaker distance
Adjust speaker level

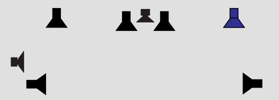
Ext. front speakers	no	small	large
Surround speakers	no	small	large
Ext. subwoofer	no	yes	
Woofer	no	yes	



Distance A	0.7 m
Distance B	0.7 m
Distance C	0.7 m



Speaker level 0



Changes to the menu with connected decoder

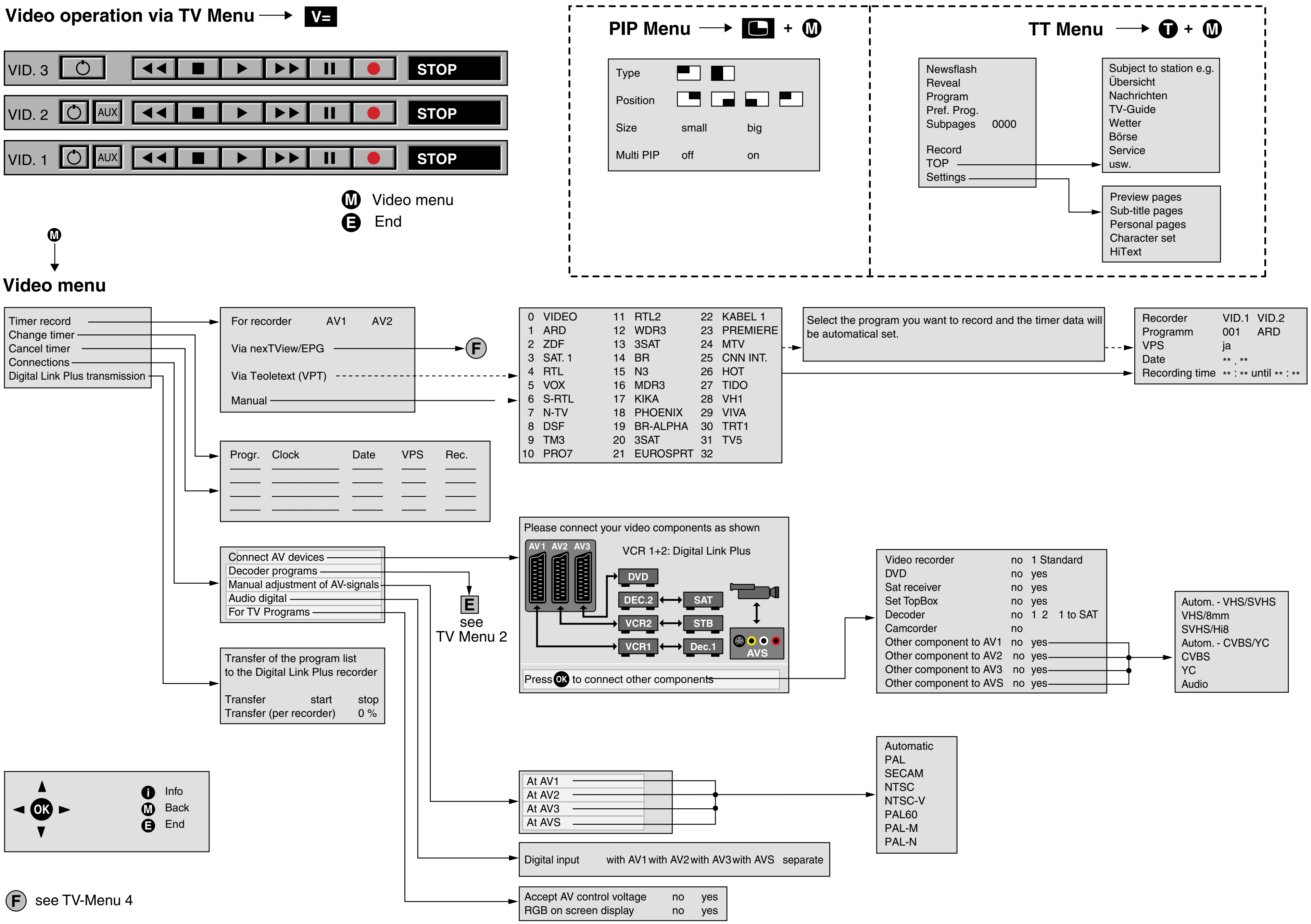
E

For Decoder to AV1
For Decoder to AV2

Sound AV 1	Decoder	TV	Autom.
Sound AV 2	Decoder	TV	Autom.

0	VIDEO	11	RTL2	22	KABEL 1
1	ARD	12	WDR3	23	PREMIERE
2	ZDF	13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

Select decoder program and confirm with OK



Video operation via TV Menu → V=

M Video menu
E End

PIP Menu → + M

Type	▀	▌		
Position	▝	▗	▖	▘
Size	small	big		
Multi PIP	off	on		

TT Menu → T + M

Newsflash
Reveal
Program
Pref. Prog.
Subpages 0000

Record
TOP
Settings

TOP →

Subject to station e.g.
Übersicht
Nachrichten
TV-Guide
Wetter
Börse
Service
usw.

Settings →

Preview pages
Sub-title pages
Personal pages
Character set
HiText

Video menu

- Timer record
- Change timer
- Cancel timer
- Connections
- Digital Link Plus transmission

Timer record →

For recorder	AV1	AV2

Via nexTView/EPG → F

Via Teoletext (VPT)

Manual

0	VIDEO	11	RTL2	22	KABEL 1
1	ARD	12	WDR3	23	PREMIERE
2	ZDF	13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

Select the program you want to record and the timer data will be automatical set.

Recorder	VID.1	VID.2
Programm	001	ARD
VPS	ja	
Date	** . **	
Recording time	** : ** until ** : **	

Change timer / Cancel timer →

Progr.	Clock	Date	VPS	Rec.
____	________	____	____	____
____	________	____	____	____
____	________	____	____	____
____	________	____	____	____

Connections →

- Connect AV devices
- Decoder programs
- Manual adjustment of AV-signals
- Audio digital
- For TV Programs

Decoder programs → E see TV Menu 2

Please connect your video components as shown

Press OK to connect other components

Video recorder	no	1 Standard
DVD	no	yes
Sat receiver	no	yes
Set TopBox	no	yes
Decoder	no	1 2 1 to SAT
Camcorder	no	
Other component to AV1	no	yes
Other component to AV2	no	yes
Other component to AV3	no	yes
Other component to AVS	no	yes

Autom. - VHS/SVHS
VHS/8mm
SVHS/Hi8
Autom. - CVBS/YC
CVBS
YC
Audio

Manual adjustment of AV-signals →

At AV1
At AV2
At AV3
At AVS

Automatic
PAL
SECAM
NTSC
NTSC-V
PAL60
PAL-M
PAL-N

Audio digital →

Digital input	with AV1	with AV2	with AV3	with AVS	separate

For TV Programs →

Accept AV control voltage	no	yes
RGB on screen display	no	yes

Digital Link Plus transmission →

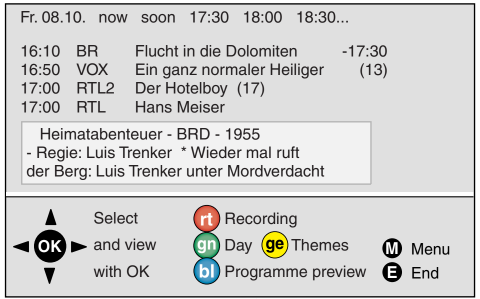
Transfer of the program list to the Digital Link Plus recorder

Transfer	start	stop
Transfer (per recorder)	0 %	

OK
i Info
M Back
E End

F see TV-Menu 4

nexTView Menu: (Button nexTView respectively EPG of the remote control)



Fr. 08.10. now soon 17:30 18:00 18:30...

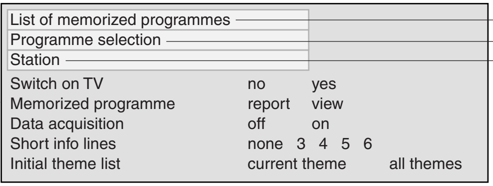
16:10	BR	Flucht in die Dolomiten	-17:30
16:50	VOX	Ein ganz normaler Heiliger	(13)
17:00	RTL2	Der Hotelboy (17)	
17:00	RTL	Hans Meiser	

Heimatabenteuer - BRD - 1955
- Regie: Luis Trenker * Wieder mal ruft
der Berg: Luis Trenker unter Mordverdacht

OK
Select
and view
with OK
rt Recording
gn Day
ge Themes
bl Programme preview
M Menu
E End

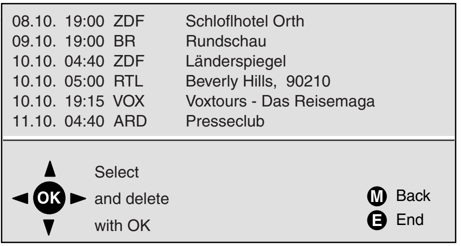
F

M



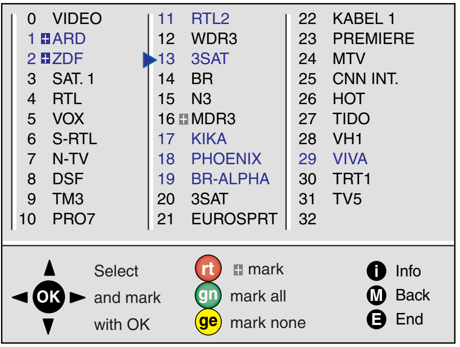
List of memorized programmes
Programme selection
Station

Switch on TV	no	yes
Memorized programme	report	view
Data acquisition	off	on
Short info lines	none 3 4 5 6	
Initial theme list	current theme	all themes



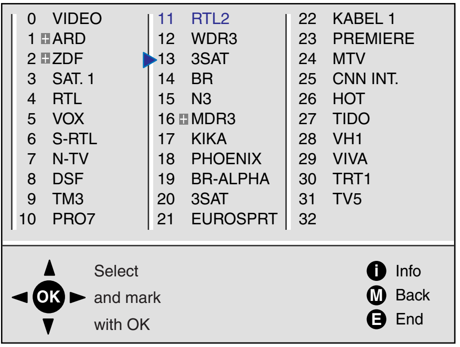
08.10.	19:00	ZDF	Schloflhotel Orth
09.10.	19:00	BR	Rundschau
10.10.	04:40	ZDF	Länderspiegel
10.10.	05:00	RTL	Beverly Hills, 90210
10.10.	19:15	VOX	Voxtours - Das Reisemaga
11.10.	04:40	ARD	Presseclub

OK
Select
and delete
with OK
M Back
E End



0	VIDEO	11	RTL2	22	KABEL 1
1 ⊞	ARD	12	WDR3	23	PREMIERE
2 ⊞	ZDF	▶13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16 ⊞	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

OK
Select
and mark
with OK
rt ⊞ mark
gn mark all
ge mark none
i Info
M Back
E End

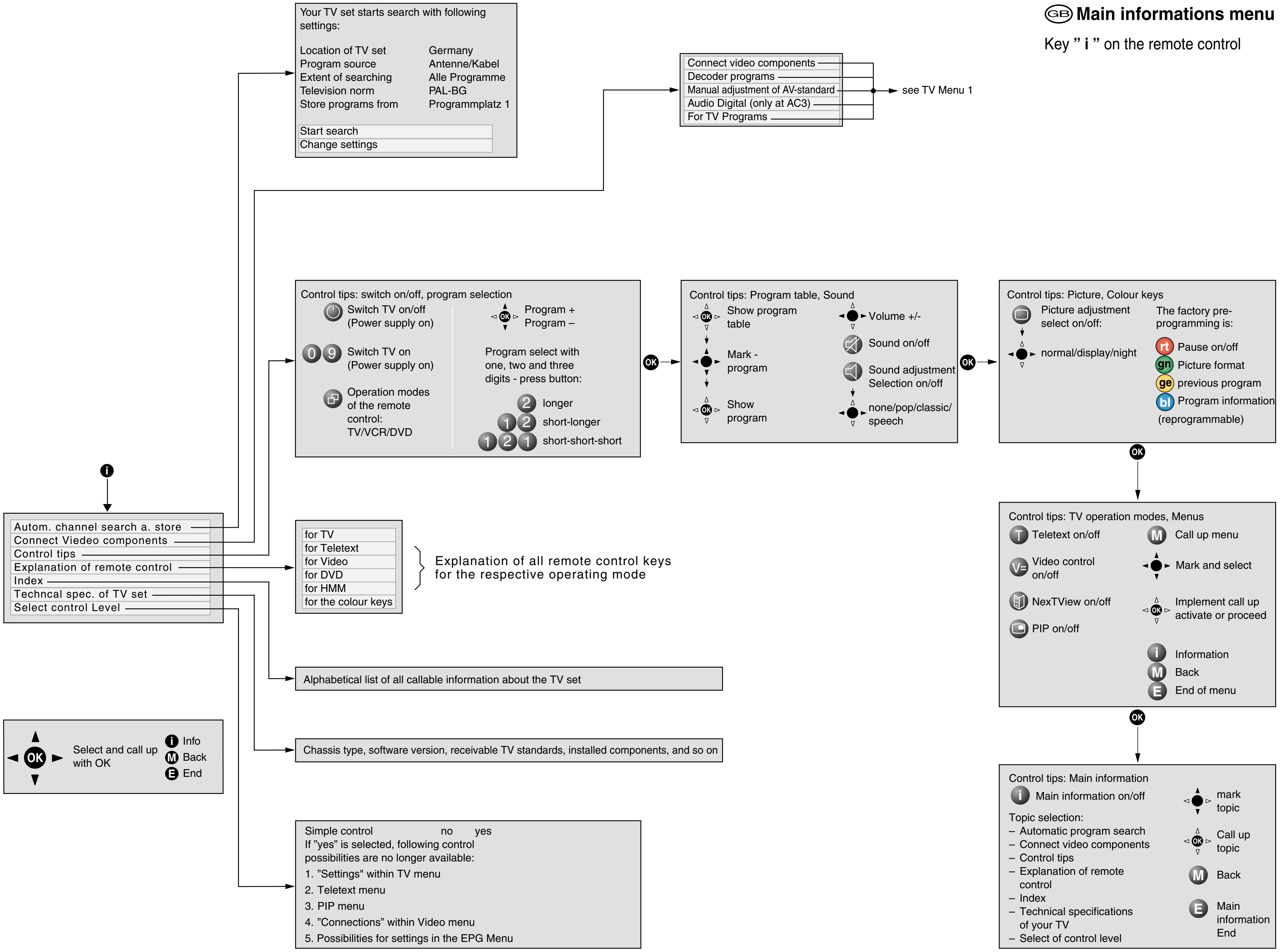


0	VIDEO	11	RTL2	22	KABEL 1
1 ⊞	ARD	12	WDR3	23	PREMIERE
2 ⊞	ZDF	▶13	3SAT	24	MTV
3	SAT. 1	14	BR	25	CNN INT.
4	RTL	15	N3	26	HOT
5	VOX	16 ⊞	MDR3	27	TIDO
6	S-RTL	17	KIKA	28	VH1
7	N-TV	18	PHOENIX	29	VIVA
8	DSF	19	BR-ALPHA	30	TRT1
9	TM3	20	3SAT	31	TV5
10	PRO7	21	EUROSPRT	32	

OK
Select
and mark
with OK
i Info
M Back
E End

GB Main informations menu

Key ” i ” on the remote control



Autom. channel search a. store
Connect Viedeo components
Control tips
Explanation of remote control
Index
Techncal spec. of TV set
Select control Level

OK Select and call up with OK
i Info
M Back
E End

Your TV set starts search with following settings:

Location of TV set	Germany
Program source	Antenne/Kabel
Extent of searching	Alle Programme
Television norm	PAL-BG
Store programs from	Programmplatz 1

Start search
Change settings

Connect video components
Decoder programs
Manual adjustment of AV-standard
Audio Digital (only at AC3)
For TV Programs

see TV Menu 1

Control tips: switch on/off, program selection

Switch TV on/off (Power supply on)

0 9 Switch TV on (Power supply on)

Operation modes of the remote control: TV/VCR/DVD

OK Program + Program –

Program select with one, two and three digits - press button:

2 longer
1 2 short-longer
1 2 1 short-short-short

Control tips: Program table, Sound

OK Show program table

Mark - program

OK Show program

Volume +/-

Sound on/off

Sound adjustment Selection on/off

none/pop/classic/ speech

Control tips: Picture, Colour keys

Picture adjustment select on/off:

normal/display/night

The factory pre-programming is:

rt Pause on/off
gn Picture format
ge previous program
bl Program information
(reprogrammable)

Control tips: TV operation modes, Menus

T Teletext on/off
V= Video control on/off
NexTView on/off
PIP on/off

M Call up menu
Mark and select
OK Implement call up activate or proceed
i Information
M Back
E End of menu

Control tips: Main information

i Main information on/off

Topic selection:
- Automatic program search
- Connect video components
- Control tips
- Explanation of remote control
- Index
- Technical specifications of your TV
- Select of control level

mark topic
OK Call up topic
M Back
E Main information End

for TV
for Teletext
for Video
for DVD
for HMM
for the colour keys

Explanation of all remote control keys for the respective operating mode

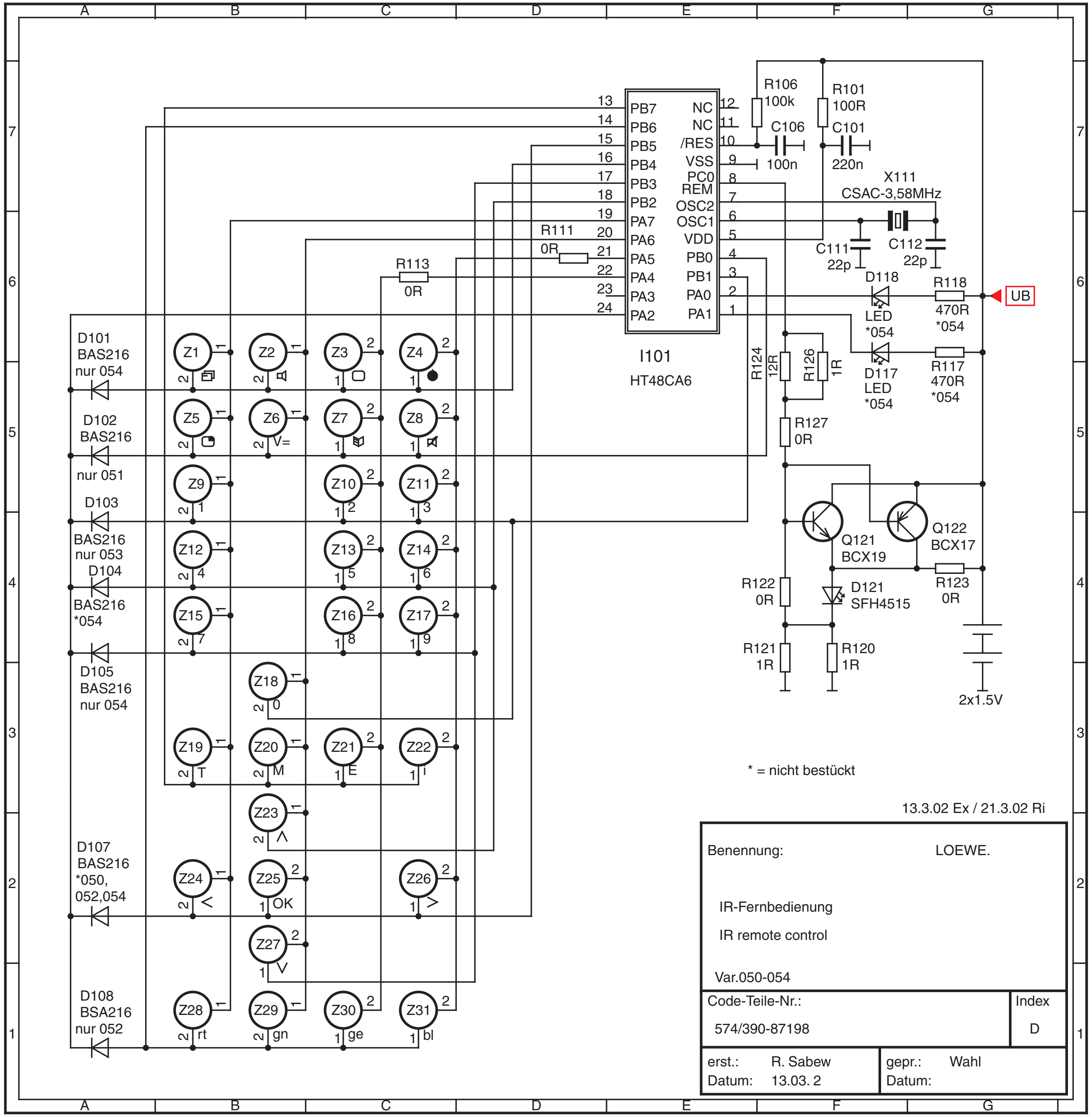
Alphabetical list of all callable information about the TV set

Chassis type, software version, receivable TV standards, installed components, and so on

Simple control	no	yes

If ”yes” is selected, following control possibilities are no longer available:

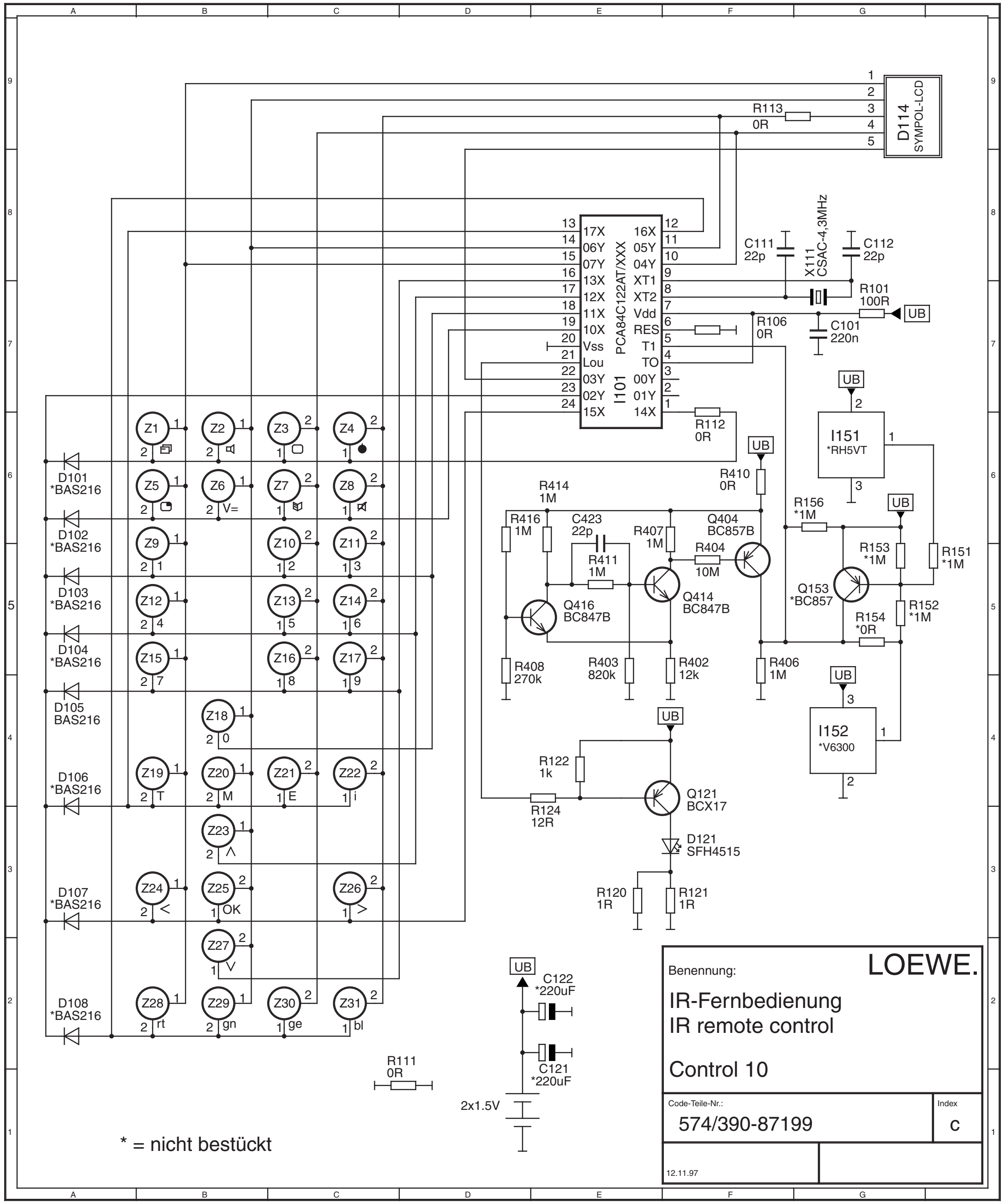
1. ”Settings" within TV menu
2. Teletext menu
3. PIP menu
4. ”Connections” within Video menu
5. Possibilities for settings in the EPG Menu


A
B
C
D
E
F
G
1
2
3
4
5
6
7
I101
HT48CA6
13 PB7
14 PB6
15 PB5
16 PB4
17 PB3
18 PB2
19 PA7
20 PA6
21 PA5
22 PA4
23 PA3
24 PA2
NC 12
NC 11
/RES 10
VSS 9
PC0 REM 8
OSC2 7
OSC1 6
VDD 5
PB0 4
PB1 3
PA0 2
PA1 1
R106
100k
R101
100R
C106
100n
C101
220n
X111
CSAC-3,58MHz
C111
22p
C112
22p
R111
0R
R113
0R
D118
LED
*054
R118
470R
*054
UB
D117
LED
*054
R117
470R
*054
R124
12R
R126
1R
R127
0R
Q121
BCX19
Q122
BCX17
R122
0R
D121
SFH4515
R123
0R
R121
1R
R120
1R
2x1.5V
D101
BAS216
nur 054
D102
BAS216
nur 051
D103
BAS216
nur 053
D104
BAS216
*054
D105
BAS216
nur 054
D107
BAS216
*050,
052,054
D108
BSA216
nur 052
Z1
Z2
Z3
Z4
Z5
Z6
V=
Z7
Z8
Z9
1
Z10
2
Z11
3
Z12
4
Z13
5
Z14
6
Z15
7
Z16
8
Z17
9
Z18
0
Z19
T
Z20
M
Z21
E
Z22
i
Z23
Λ
Z24
<
Z25
OK
Z26
>
Z27
V
Z28
rt
Z29
gn
Z30
ge
Z31
bl
* = nicht bestückt

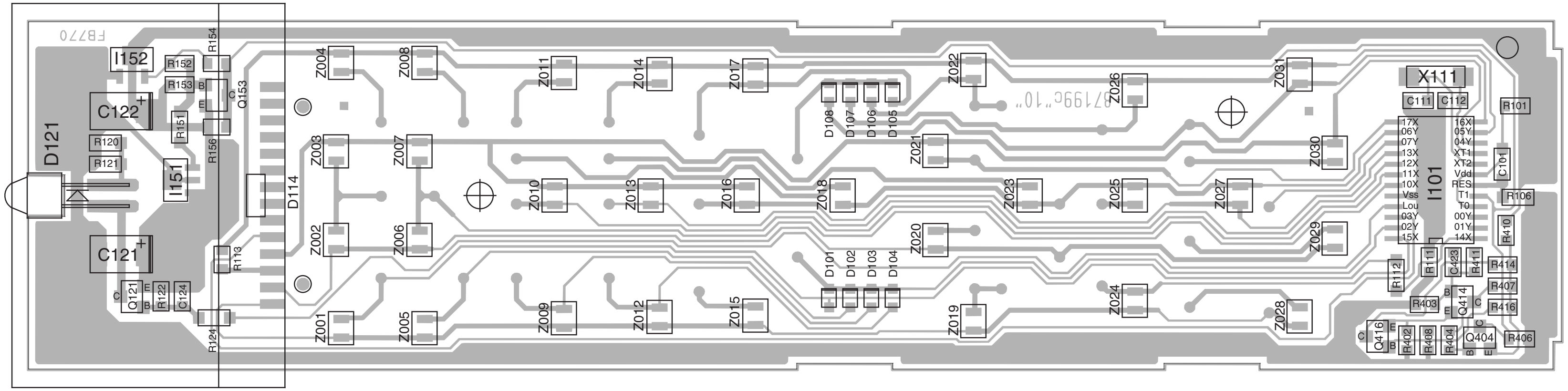
13.3.02 Ex / 21.3.02 Ri

Benennung:	LOEWE.
IR-Fernbedienung IR remote control Var.050-054	
Code-Teile-Nr.: 574/390-87198	Index D
erst.: R. Sabew Datum: 13.03. 2	gepr.: Wahl Datum:

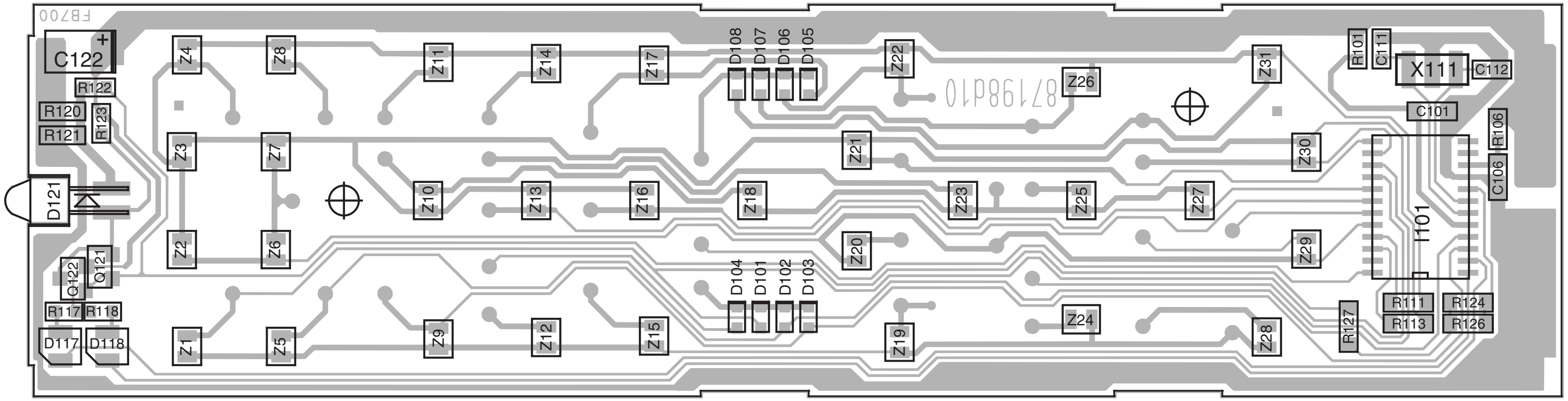
Schaltbild Fernbedienung 87000.060 ab 04/2002


D114
SYMPOL-LCD
R113
0R
I101
PCA84C122AT/XXX
17X
06Y
07Y
13X
12X
11X
10X
Vss
Lou
03Y
02Y
15X
16X
05Y
04Y
XT1
XT2
Vdd
RES
T1
TO
00Y
01Y
14X
C111
22p
X111
CSAC-4,3MHz
C112
22p
R101
100R
UB
R106
0R
C101
220n
R112
0R
I151
*RH5VT
I152
*V6300
R410
0R
R414
1M
R416
1M
C423
22p
R407
1M
R404
10M
Q404
BC857B
R411
1M
Q416
BC847B
Q414
BC847B
R156
*1M
R153
*1M
R151
*1M
Q153
*BC857
R154
*0R
R152
*1M
R408
270k
R403
820k
R402
12k
R406
1M
R122
1k
R124
12R
Q121
BCX17
D121
SFH4515
R120
1R
R121
1R
C122
*220uF
C121
*220uF
2x1.5V
R111
0R
D101
*BAS216
D102
*BAS216
D103
*BAS216
D104
*BAS216
D105
BAS216
D106
*BAS216
D107
*BAS216
D108
*BAS216
Z1
Z2
Z3
Z4
Z5
Z6
V=
Z7
Z8
Z9
1
Z10
2
Z11
3
Z12
4
Z13
5
Z14
6
Z15
7
Z16
8
Z17
9
Z18
0
Z19
T
Z20
M
Z21
E
Z22
i
Z23
Λ
Z24
<
Z25
OK
Z26
>
Z27
V
Z28
rt
Z29
gn
Z30
ge
Z31
bl
* = nicht bestückt
Benennung:
LOEWE.
IR-Fernbedienung
IR remote control
Control 10
Code-Teile-Nr.:
574/390-87199
Index
c
12.11.97

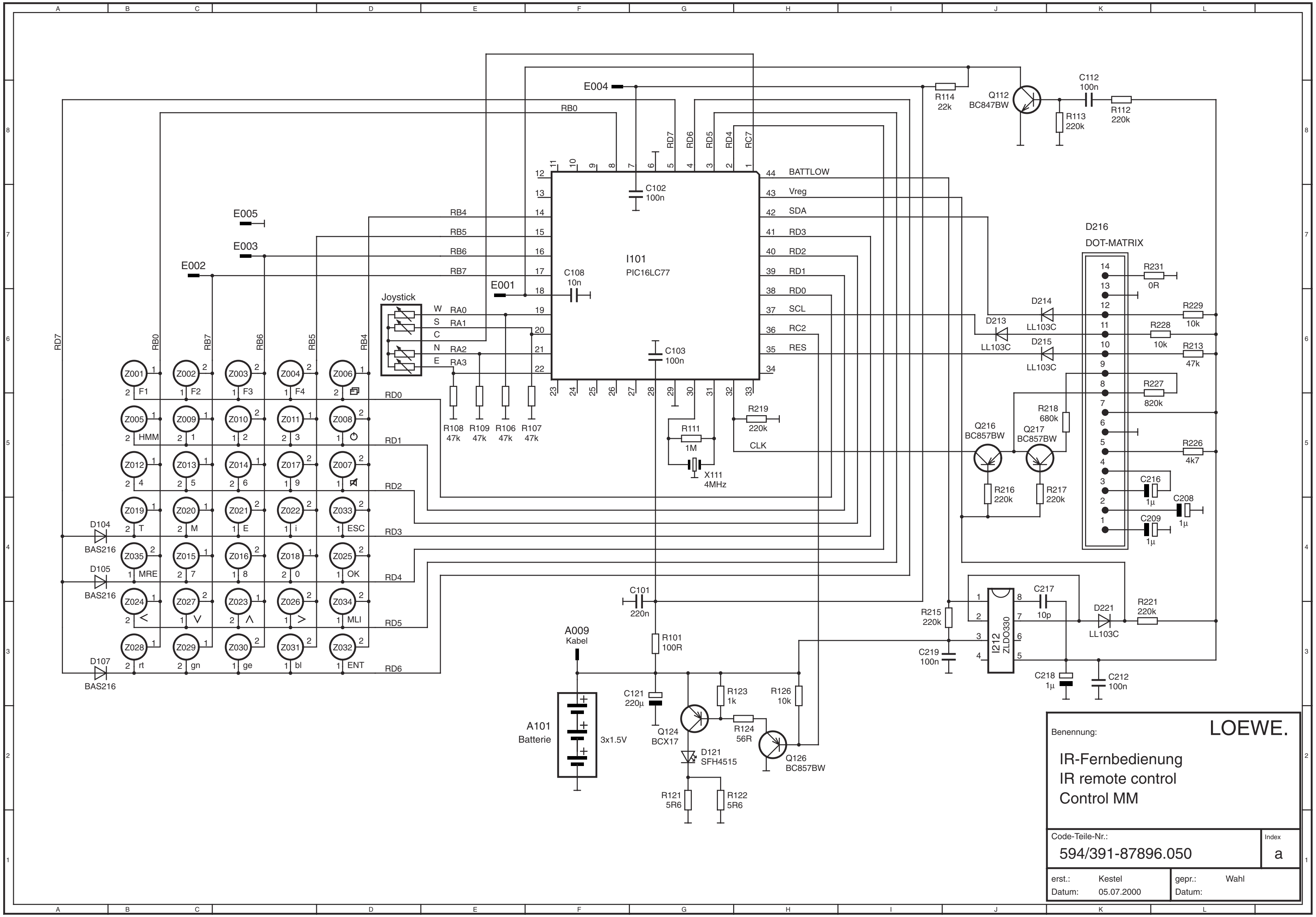
Schaltbild Fernbedienung 87000.070/071 **Remote Control schematic 87000.070/071**


FB770
I152
R152
R153
R154
Q153
C122
R151
R156
R120
R121
D121
I151
C121
R113
Q121
R122
C124
R124
D114
Z001
Z002
Z003
Z004
Z005
Z006
Z007
Z008
Z009
Z010
Z011
Z012
Z013
Z014
Z015
Z016
Z017
Z018
Z019
Z020
Z021
Z022
Z023
Z024
Z025
Z026
Z027
Z028
Z029
Z030
Z031
D101
D102
D103
D104
D105
D106
D107
D108
87199c"10"
X111
C111
C112
R101
I101
17X
06Y
07Y
13X
12X
11X
10X
Vss
Lou
03Y
02Y
15X
16X
05Y
04Y
XT1
XT2
Vdd
RES
T1
T0
00Y
01Y
14X
C101
R106
R410
R411
C423
R111
R112
R414
R407
R416
R403
Q414
Q416
R402
R408
R404
Q404
R406

Ltpl. Fernbedienung 87000.070/071 (87199C) **Remote Control P.C.B 87000.070/071 (87199C)**

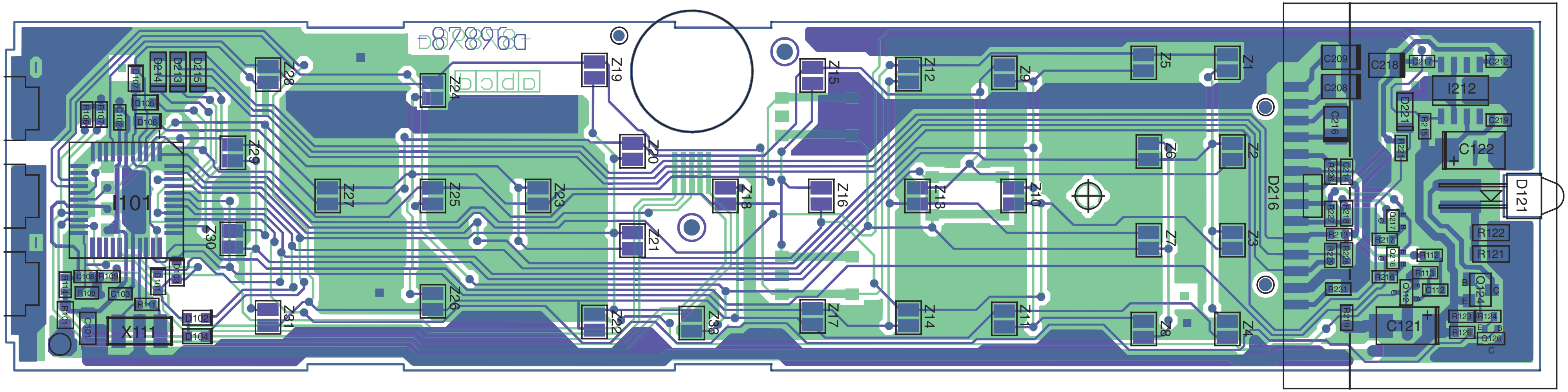

FB700
C122
R122
R120
R123
R121
D121
Q122
Q121
R117
R118
D117
D118
Z1
Z2
Z3
Z4
Z5
Z6
Z7
Z8
Z9
Z10
Z11
Z12
Z13
Z14
Z15
Z16
Z17
Z18
Z19
Z20
Z21
Z22
Z23
Z24
Z25
Z26
Z27
Z28
Z29
Z30
Z31
D108
D107
D106
D105
D104
D101
D102
D103
87198d10
R101
C111
X111
C112
C101
R106
C106
I101
R127
R111
R113
R124
R126

Ltpl. Fernbedienung 87000.050-065 (87198.050-056E) Bestückungsseite
Remote Control P.C.B 87000.050-065 (87198.050-056E) Components side


LOEWE.
Benennung:
IR-Fernbedienung
IR remote control
Control MM
Code-Teile-Nr.:
594/391-87896.050
Index
a
erst.: Kestel
Datum: 05.07.2000
gepr.: Wahl
Datum:
I101
PIC16LC77
BATTLOW
Vreg
SDA
RD3
RD2
RD1
RD0
SCL
RC2
RES
CLK
RB0
RB4
RB5
RB6
RB7
RD7
RD6
RD5
RD4
RC7
RA0
RA1
RA2
RA3
Joystick
W
S
C
N
E
E001
E002
E003
E004
E005
C102 100n
C103 100n
C108 10n
C101 220n
C121 220µ
R108 47k
R109 47k
R106 47k
R107 47k
R111 1M
X111 4MHz
R219 220k
R114 22k
Q112 BC847BW
R113 220k
C112 100n
R112 220k
D216
DOT-MATRIX
R231 0R
R229 10k
R228 10k
R213 47k
R227 820k
R226 4k7
R218 680k
D213 LL103C
D214 LL103C
D215 LL103C
Q216 BC857BW
Q217 BC857BW
R216 220k
R217 220k
C216 1µ
C208 1µ
C209 1µ
R215 220k
C219 100n
I212 ZLDO330
C217 10p
D221 LL103C
R221 220k
C218 1µ
C212 100n
A009 Kabel
A101 Batterie
3x1.5V
R101 100R
R123 1k
R124 56R
R126 10k
Q124 BCX17
Q126 BC857BW
D121 SFH4515
R121 5R6
R122 5R6
D104 BAS216
D105 BAS216
D107 BAS216
Z001 F1
Z002 F2
Z003 F3
Z004 F4
Z006
Z005 HMM
Z009 1
Z010 2
Z011 3
Z008
Z012 4
Z013 5
Z014 6
Z017 9
Z007
Z019 T
Z020 M
Z021 E
Z022 i
Z033 ESC
Z035 MRE
Z015 7
Z016 8
Z018 0
Z025 OK
Z024 <
Z027 V
Z023 Λ
Z026 >
Z034 MLI
Z028 rt
Z029 gn
Z030 ge
Z031 bl
Z032 ENT
A B C D E F G H I J K L

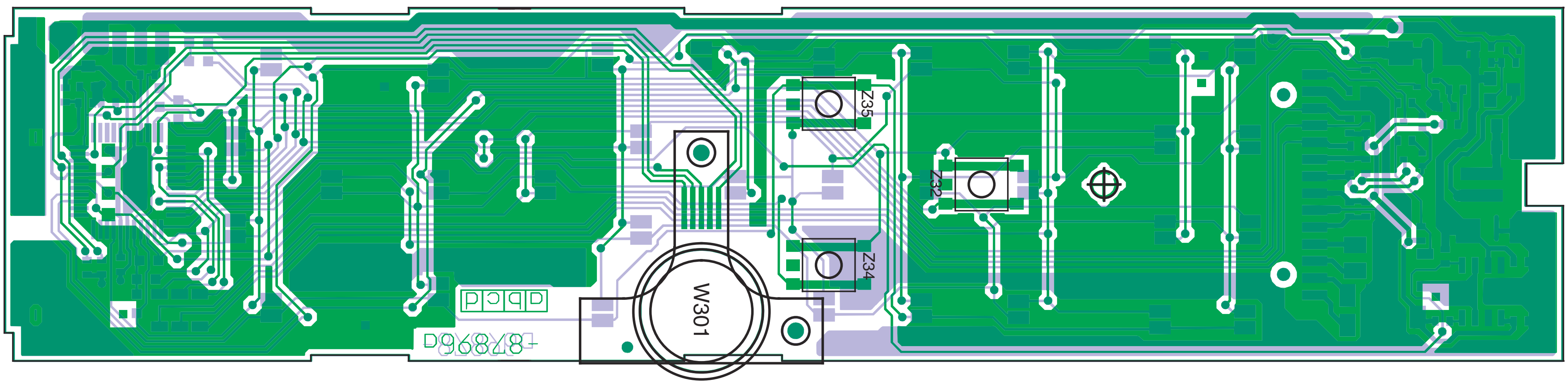
Schaltplan IR-Fernbedienung 396-87000.091

Infrared remote control schematic 396-87000.091


I101
X111
Z1
Z2
Z3
Z4
Z5
Z6
Z7
Z8
Z9
Z10
Z11
Z12
Z13
Z14
Z15
Z16
Z17
Z18
Z19
Z20
Z21
Z22
Z23
Z24
Z25
Z26
Z27
Z28
Z29
Z30
Z31
Z33
D102
D104
D105
D106
D107
D213
D214
D215
D216
D221
D121
C101
C103
C106
C208
C209
C212
C216
C217
C218
C219
C121
C122
I212
R108
R109
R111
R112
R113
R121
R122
R123
R124
R126
R213
R215
R216
R217
R219
R231
Q112
Q124
Q126
Q216
Q217

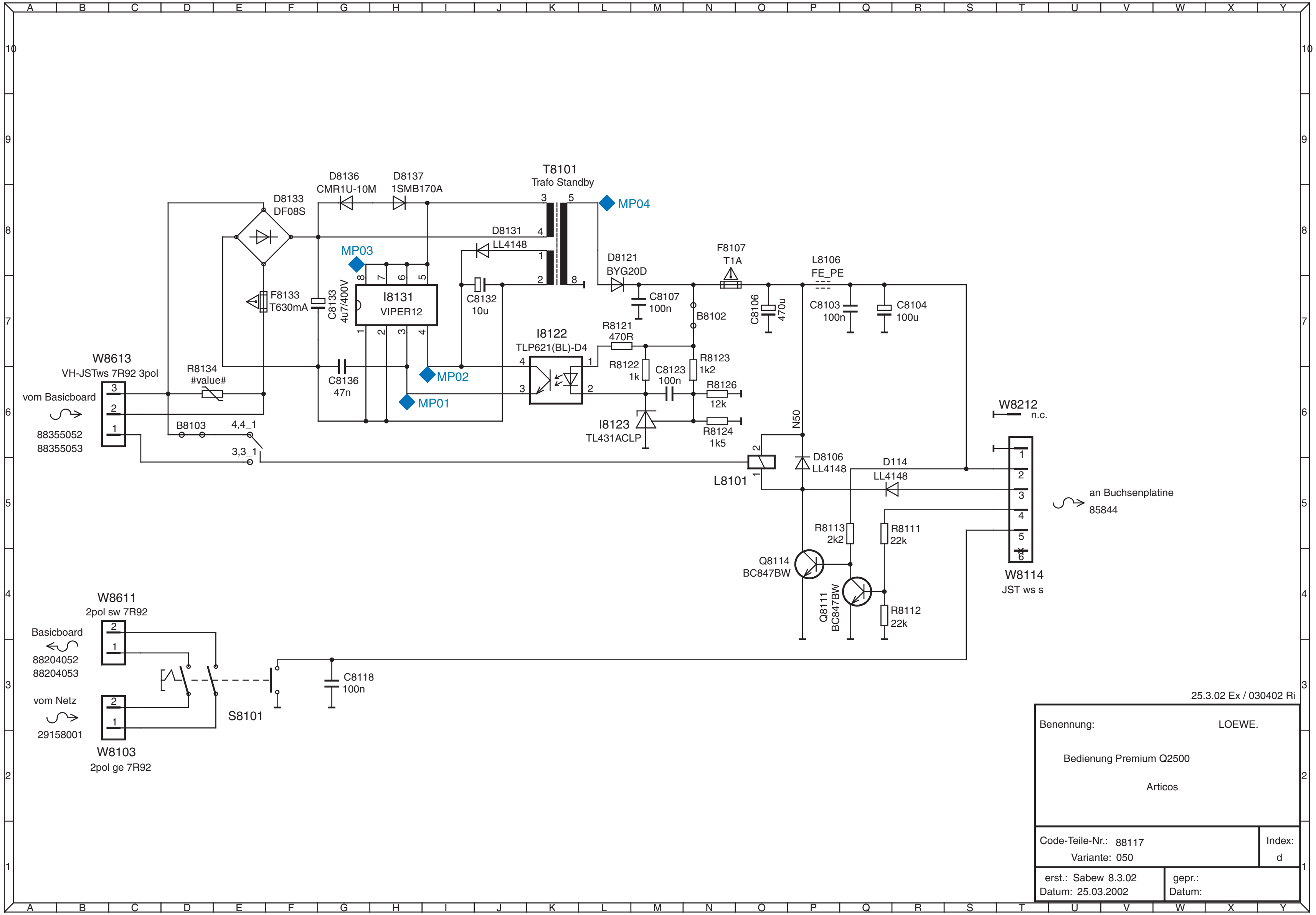
Ltpl. Fernbedienung Remote Control P.C.B 87000.091

Bestückungsseite Components Side


Z32
Z34
Z35
W301

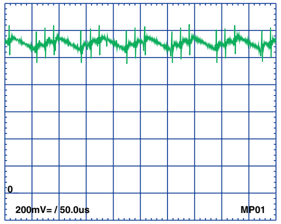
Ltpl. Fernbedienung Remote Control P.C.B 87000.091

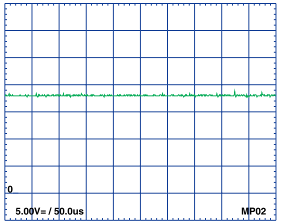
Lötseite Solder Side

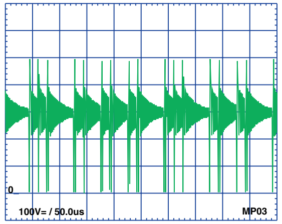

A B C D E F G H I J K L M N O P Q R S T U V W X Y
10 9 8 7 6 5 4 3 2 1
T8101
Trafo Standby
3 5
4 1 2 8
MP04
D8136
CMR1U-10M
D8137
1SMB170A
D8133
DF08S
D8131
LL4148
MP03
8 7 6 5
I8131
VIPER12
1 2 3 4
F8133
T630mA
C8133
4u7/400V
C8132
10u
D8121
BYG20D
C8107
100n
F8107
T1A
B8102
C8106
470u
L8106
FE_PE
C8103
100n
C8104
100u
R8121
470R
I8122
TLP621(BL)-D4
4 1 3 2
R8122
1k
C8123
100n
R8123
1k2
R8126
12k
R8124
1k5
I8123
TL431ACLP
W8613
VH-JSTws 7R92 3pol
vom Basicboard
88355052
88355053
3 2 1
R8134
#value#
C8136
47n
MP02
MP01
B8103
4,4_1
3,3_1
N50
L8101
2 1
D8106
LL4148
D114
LL4148
W8212
n.c.
1 2 3 4 5 6
W8114
JST ws s
an Buchsenplatine
85844
R8113
2k2
R8111
22k
Q8114
BC847BW
Q8111
BC847BW
R8112
22k
W8611
2pol sw 7R92
Basicboard
88204052
88204053
2 1
vom Netz
29158001
W8103
2pol ge 7R92
S8101
C8118
100n

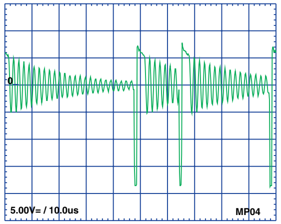
25.3.02 Ex / 030402 Ri

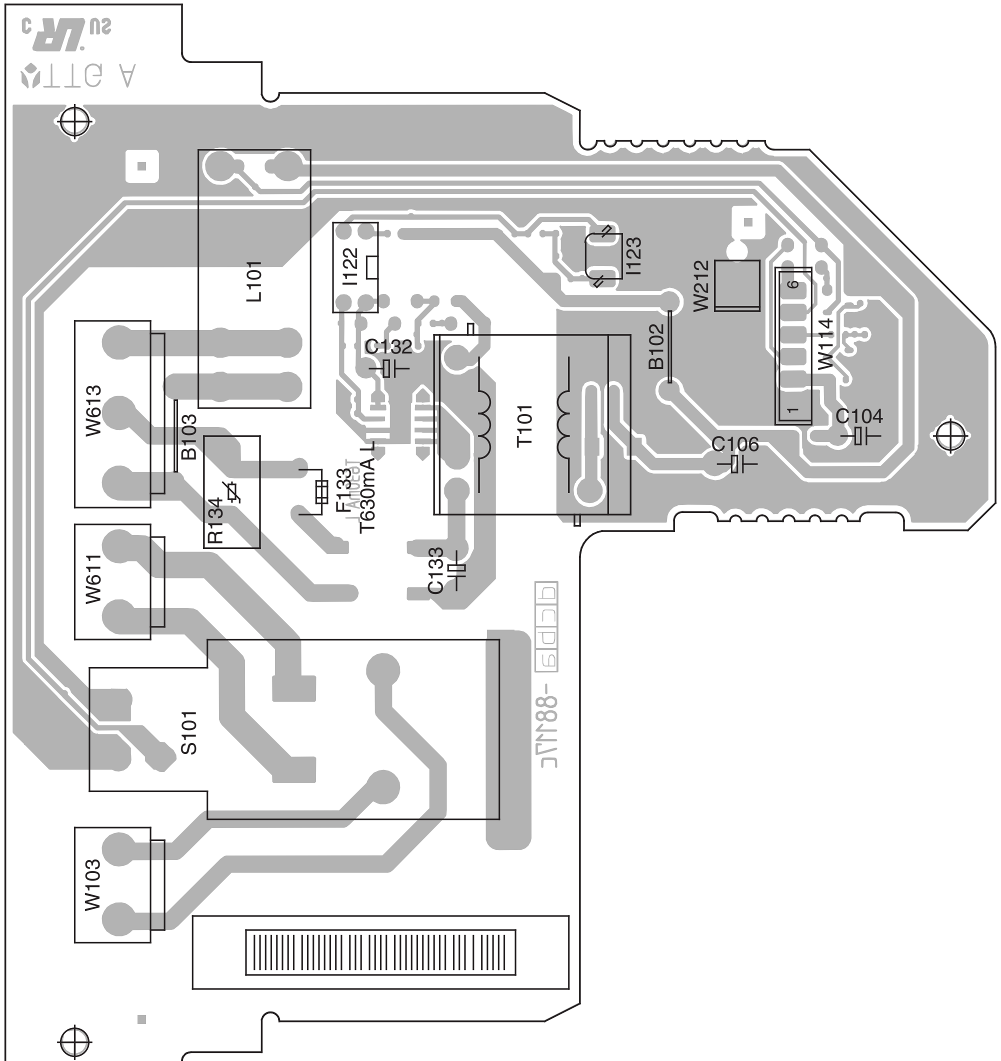
Benennung: LOEWE. Bedienung Premium Q2500 Articos	
Code-Teile-Nr.: 88117 Variante: 050	Index: d
erst.: Sabew 8.3.02 Datum: 25.03.2002	gepr.: Datum:



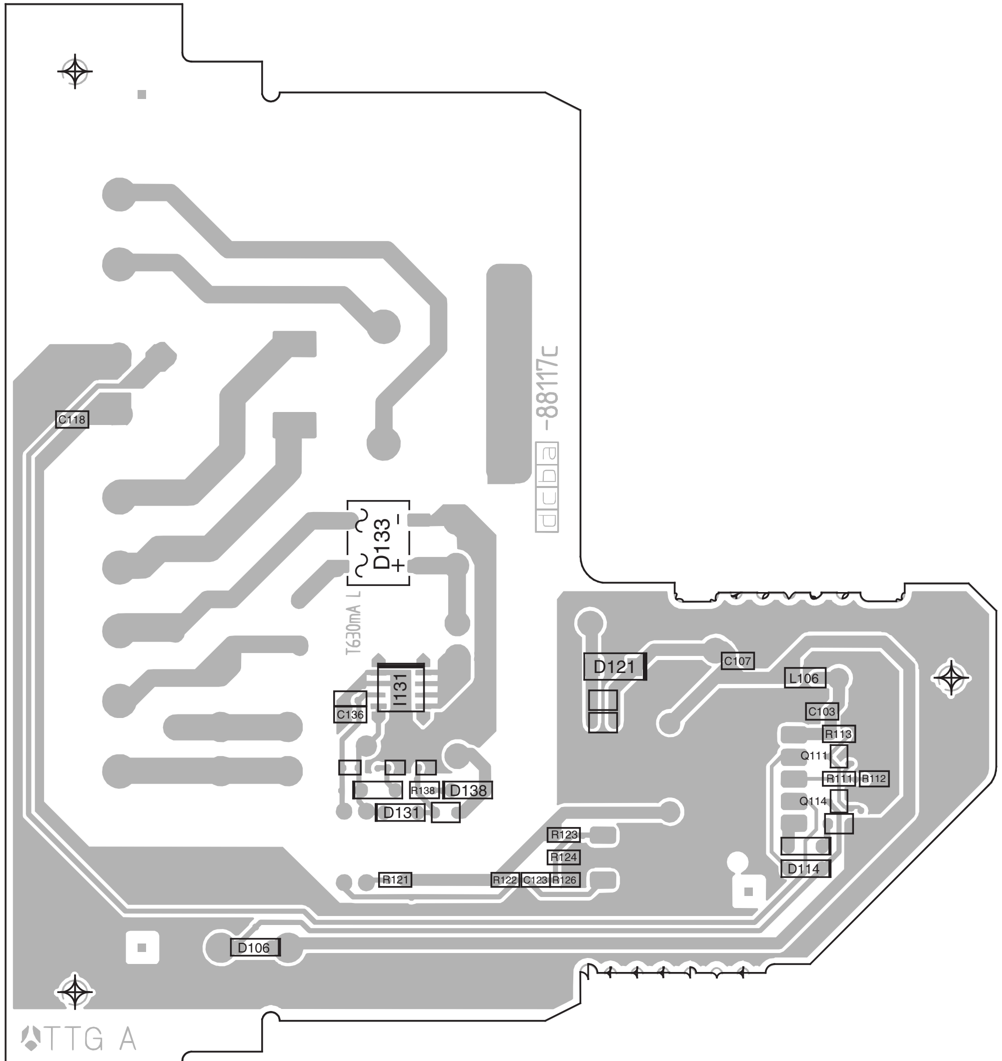




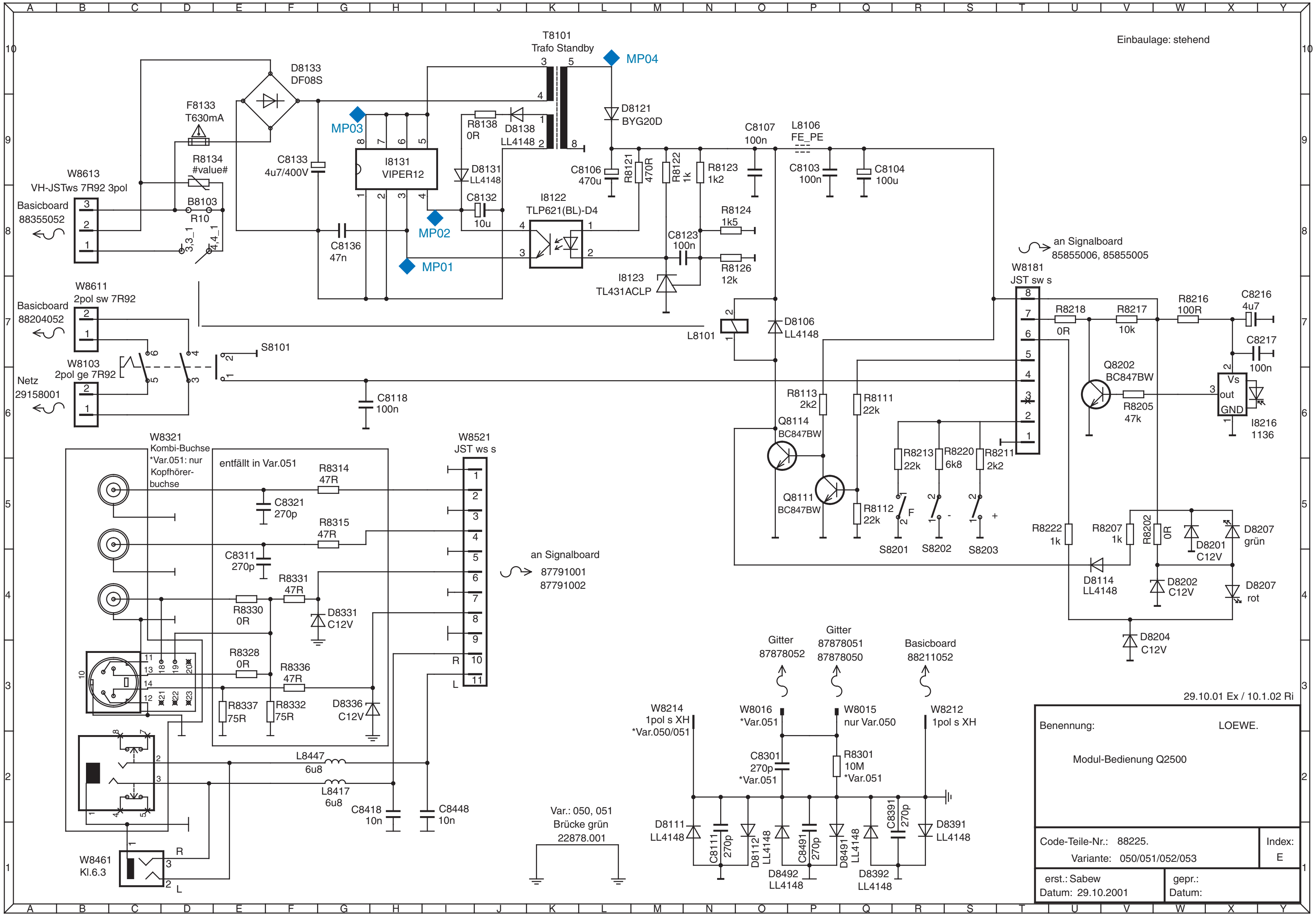


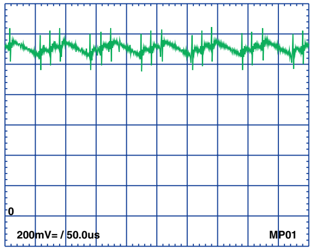

TTG A
L101
I122
I123
W212
C132
B102
W114
W613
T101
C104
C106
B103
R134
F133
T630mA L
W611
C133
S101
-88117C
W103

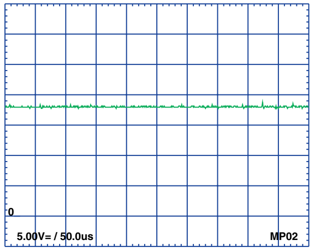
Ltpl. Bedienteil 88117C Bestückungsseite
Control Unit P.C.B 88117C Components side


-88117C
C118
D133
T630mA L
I131
C136
D121
C107
L106
C103
R113
Q111
R111
R112
Q114
R138
D138
D131
R123
R124
R121
R122
C123
R126
D114
D106
TTG A

Ltpl. Bedienteil 88117C Lötseite
Control Unit P.C.B 88117C Solder side


Einbaulage: stehend
T8101
Trafo Standby
MP04
D8133
DF08S
F8133
T630mA
D8121
BYG20D
MP03
I8131
VIPER12
R8138
0R
D8138
LL4148
C8133
4u7/400V
R8134
#value#
W8613
VH-JSTws 7R92 3pol
Basicboard
88355052
B8103
R10
D8131
LL4148
C8106
470u
R8121
470R
R8122
1k
R8123
1k2
C8107
100n
L8106
FE_PE
C8103
100n
C8104
100u
C8132
10u
I8122
TLP621(BL)-D4
MP02
C8136
47n
MP01
R8124
1k5
C8123
100n
R8126
12k
I8123
TL431ACLP
an Signalboard
85855006, 85855005
W8181
JST sw s
W8611
2pol sw 7R92
Basicboard
88204052
S8101
L8101
D8106
LL4148
R8218
0R
R8217
10k
R8216
100R
C8216
4u7
C8217
100n
Q8202
BC847BW
R8205
47k
I8216
1136
W8103
2pol ge 7R92
Netz
29158001
C8118
100n
R8113
2k2
R8111
22k
Q8114
BC847BW
R8213
22k
R8220
6k8
R8211
2k2
Q8111
BC847BW
R8112
22k
S8201
S8202
S8203
R8222
1k
R8207
1k
R8202
0R
D8201
C12V
D8207
grün
D8114
LL4148
D8202
C12V
D8207
rot
D8204
C12V
W8321
Kombi-Buchse
*Var.051: nur
Kopfhörer-
buchse
entfällt in Var.051
R8314
47R
C8321
270p
R8315
47R
C8311
270p
R8331
47R
D8331
C12V
R8330
0R
R8328
0R
R8336
47R
R8337
75R
R8332
75R
D8336
C12V
W8521
JST ws s
an Signalboard
87791001
87791002
L8447
6u8
L8417
6u8
C8418
10n
C8448
10n
W8461
Kl.6.3
Var.: 050, 051
Brücke grün
22878.001
Gitter
87878052
Gitter
87878051
87878050
Basicboard
88211052
W8214
1pol s XH
*Var.050/051
W8016
*Var.051
W8015
nur Var.050
W8212
1pol s XH
C8301
270p
*Var.051
R8301
10M
*Var.051
D8111
LL4148
C8111
270p
D8112
LL4148
D8492
LL4148
C8491
270p
D8491
LL4148
D8392
LL4148
C8391
270p
D8391
LL4148
29.10.01 Ex / 10.1.02 Ri
Benennung:
LOEWE.
Modul-Bedienung Q2500
Code-Teile-Nr.: 88225.
Variante: 050/051/052/053
Index:
E
erst.: Sabew
Datum: 29.10.2001
gepr.:
Datum:


0
200mV= / 50.0us
MP01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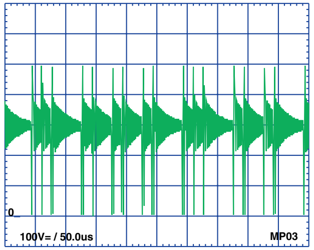
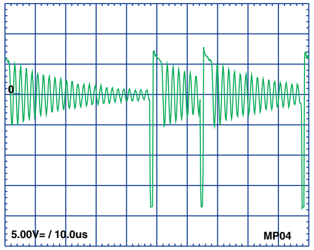
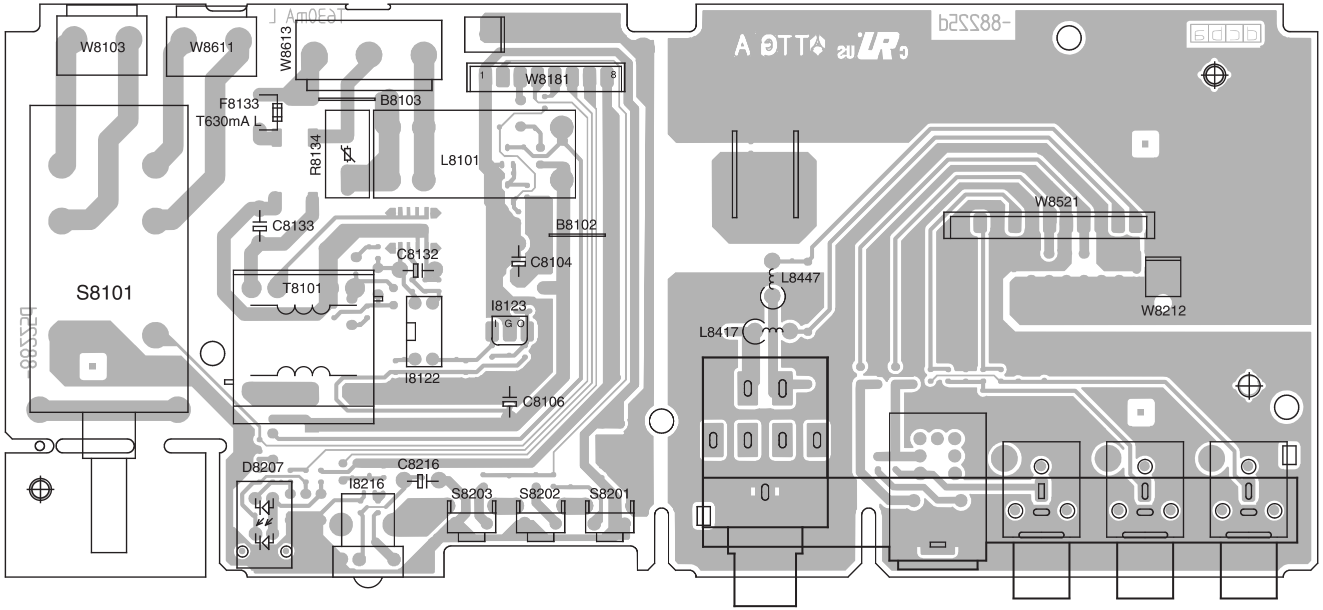
5.00V= / 50.0us
MP02


0
100V= / 50.0us
MP03


0
5.00V= / 10.0us
MP04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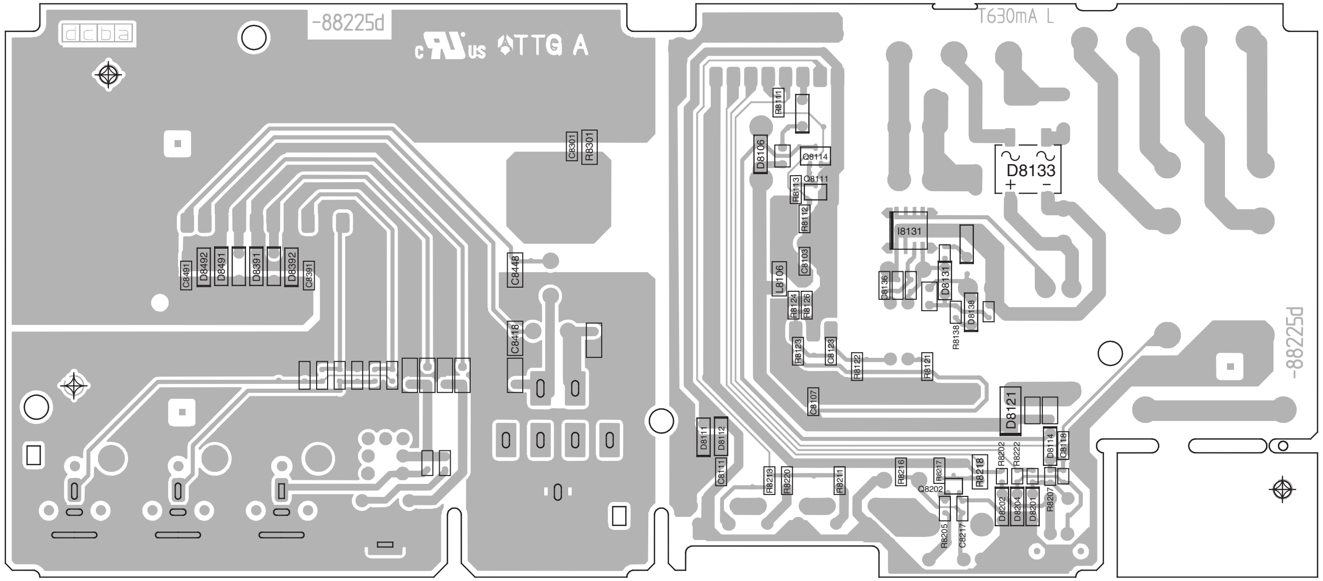
W8611
W8613
T630mA L
B8103
W8181
1
8
F8133
T630mA L
R8134
L8101
C8133
B8102
C8132
C8104
S8101
T8101
I8123
I G O
I8122
C8106
D8207
C8216
I8216
S8203
S8202
S8201
88225d
-88225d
L8447
L8417
W8521
W8212
A

Ltpl. Bedienteil 88225D

Bestückungsseite

Control Unit P.C.B 88225D

Components side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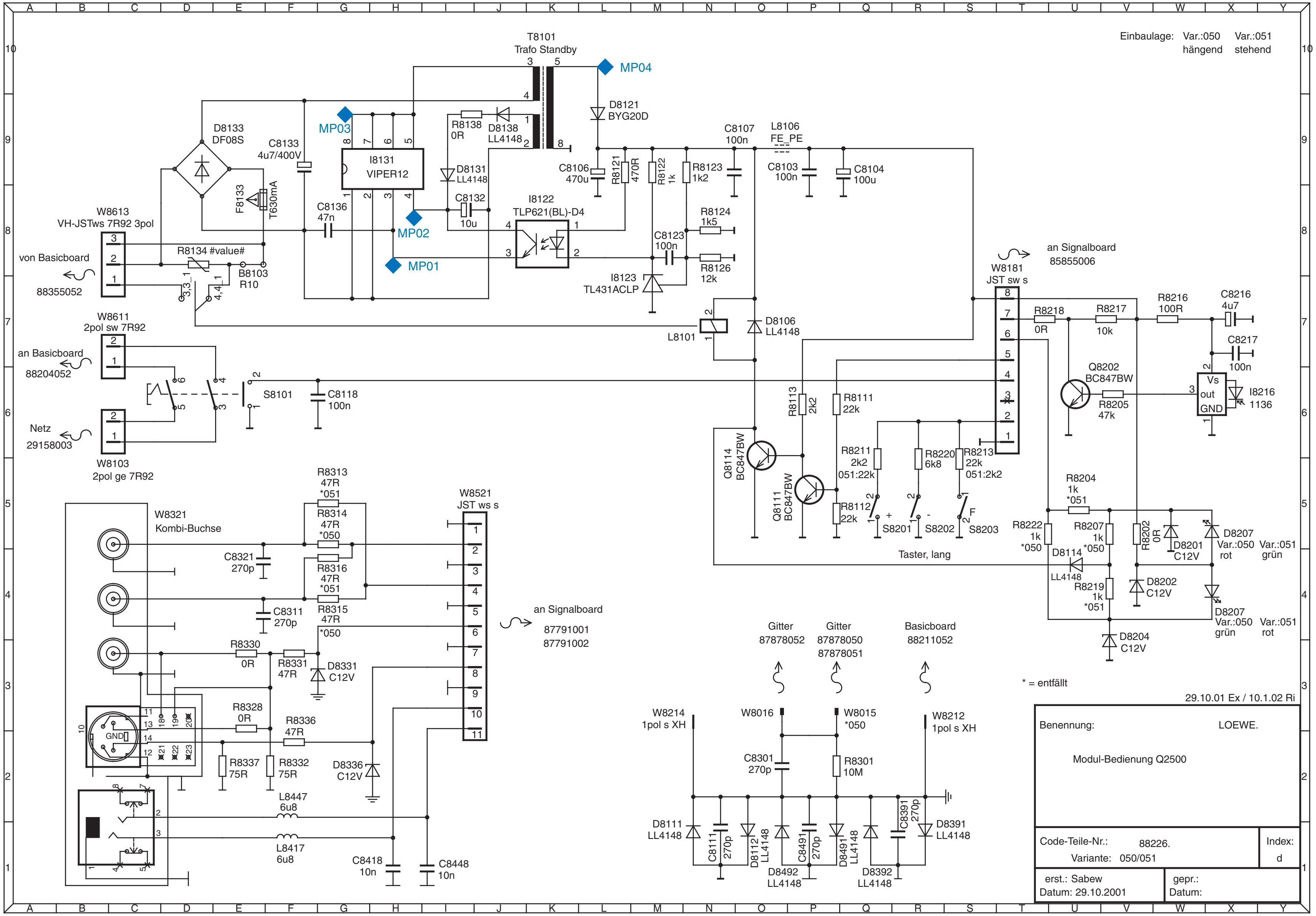
T630mA L
C8301
R8301
C8491
D8492
D8491
D8391
D8392
C8391
C8448
C8418
R8111
D8106
Q8114
Q8111
R8113
R8112
C8103
L8106
R8124
R8126
R8123
C8123
R8122
R8121
C8107
D8133
+
−
I8131
C8136
D8131
D8138
R8138
D8121
D8111
D8112
C8111
R8213
R8220
R8211
R8216
R8217
Q8202
R8218
R8202
R8222
D8114
C8118
R8205
C8217
D8202
D8204
D8201
R8207
-88225d
A

Ltpl. Bedienteil 88225D

Lötseite

Control Unit P.C.B 88225D

Solder side


T8101
Trafo Standby
MP04
MP03
MP02
MP01
D8121
BYG20D
D8133
DF08S
C8133
4u7/400V
I8131
VIPER12
R8138
0R
D8138
LL4148
D8131
LL4148
C8132
10u
C8136
47n
F8133
T630mA
W8613
VH-JSTws 7R92 3pol
von Basicboard
88355052
R8134 #value#
B8103
R10
I8122
TLP621(BL)-D4
C8106
470u
R8121
470R
R8122
1k
R8123
1k2
C8107
100n
L8106
FE_PE
C8103
100n
C8104
100u
R8124
1k5
C8123
100n
R8126
12k
I8123
TL431ACLP
L8101
D8106
LL4148
W8611
2pol sw 7R92
an Basicboard
88204052
S8101
C8118
100n
Netz
29158003
W8103
2pol ge 7R92
an Signalboard
85855006
W8181
JST sw s
R8218
0R
R8217
10k
R8216
100R
C8216
4u7
C8217
100n
Q8202
BC847BW
R8205
47k
I8216
1136
Vs
out
GND
R8113
2k2
R8111
22k
Q8114
BC847BW
Q8111
BC847BW
R8211
2k2
051:22k
R8220
6k8
R8213
22k
051:2k2
R8112
22k
S8201
S8202
S8203
Taster, lang
R8204
1k
*051
R8222
1k
*050
R8207
1k
*050
R8202
0R
D8201
C12V
D8207
Var.:050 rot
Var.:051 grün
D8114
LL4148
R8219
1k
*051
D8202
C12V
D8207
Var.:050 grün
Var.:051 rot
D8204
C12V
W8321
Kombi-Buchse
C8321
270p
R8313
47R
*051
R8314
47R
*050
R8316
47R
*051
R8315
47R
*050
C8311
270p
W8521
JST ws s
an Signalboard
87791001
87791002
R8330
0R
R8331
47R
D8331
C12V
R8328
0R
R8336
47R
R8337
75R
R8332
75R
D8336
C12V
GND
L8447
6u8
L8417
6u8
C8418
10n
C8448
10n
Gitter
87878052
Gitter
87878050
87878051
Basicboard
88211052
W8214
1pol s XH
W8016
W8015
*050
W8212
1pol s XH
C8301
270p
R8301
10M
D8111
LL4148
C8111
270p
D8112
LL4148
C8491
270p
D8491
LL4148
C8391
270p
D8391
LL4148
D8492
LL4148
D8392
LL4148
Einbaulage: Var.:050 hängend Var.:051 stehend
* = entfällt
29.10.01 Ex / 10.1.02 Ri
A B C D E F G H I J K L M N O P Q R S T U V W X Y
1 2 3 4 5 6 7 8 9 10

Benennung: LOEWE.

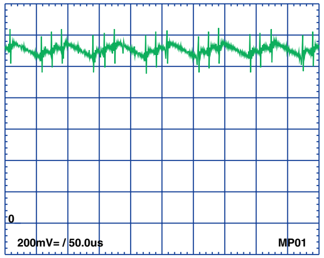
Modul-Bedienung Q2500

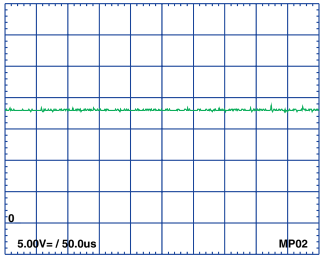
Code-Teile-Nr.: 88226.
Variante: 050/051

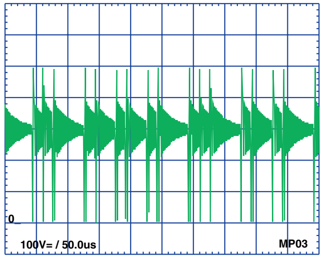
Index: d

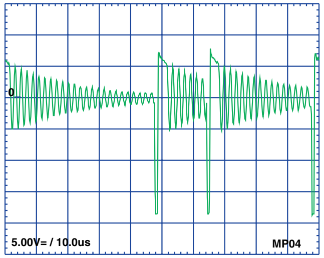
erst.: Sabew
Datum: 29.10.2001

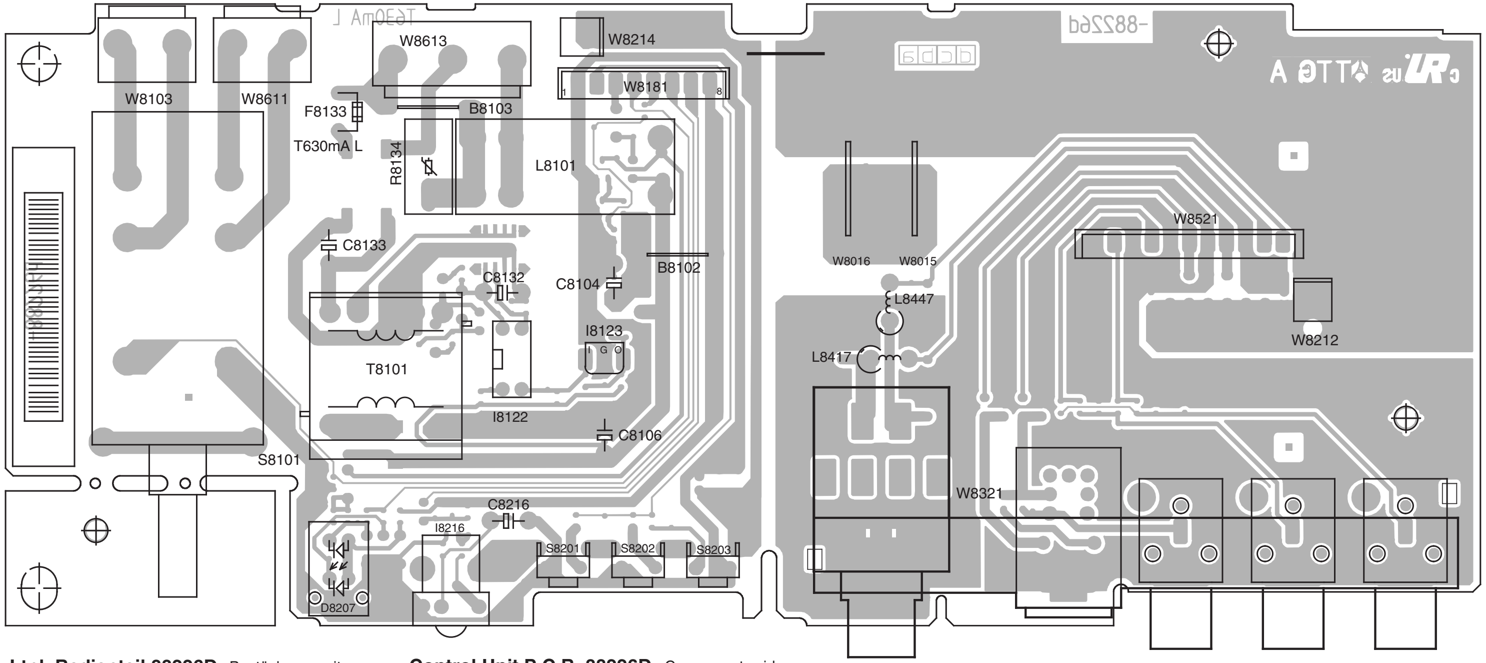
gepr.:
Datum:



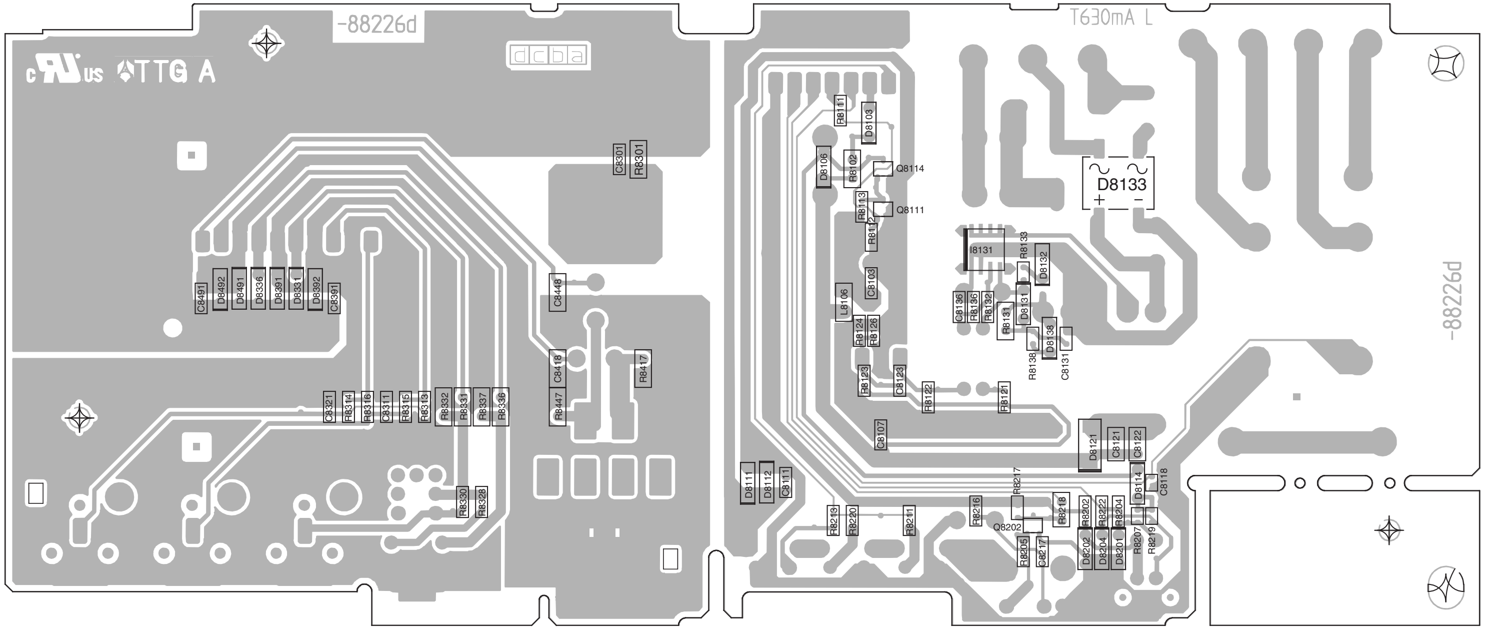




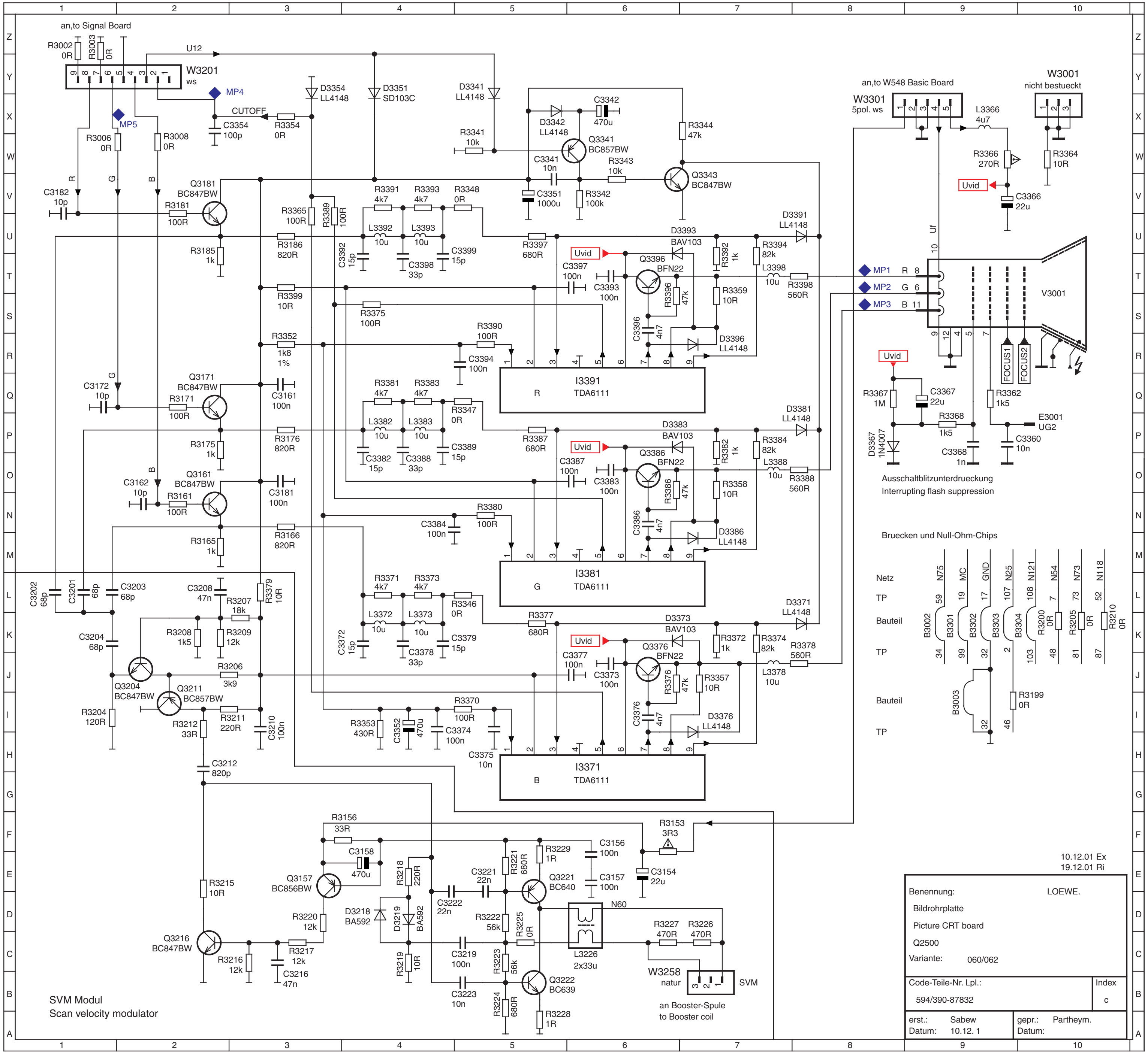



W8103
W8611
W8613
W8214
W8181
F8133
T630mA L
B8103
R8134
L8101
C8133
C8132
C8104
B8102
I8123
T8101
I8122
C8106
S8101
C8216
I8216
S8201
S8202
S8203
D8207
W8016
W8015
L8447
L8417
W8521
W8212
W8321
-88226d
A
cULus

Ltpl. Bedienteil 88226D Bestückungsseite **Control Unit P.C.B 88226D** Components side


-88226d
T630mA L
cULus
A
C8301
R8301
C8491
D8492
D8491
D8336
D8391
D8331
D8392
C8391
C8448
C8418
R8417
R8447
C8321
R8314
R8316
C8311
R8315
R8313
R8332
R8331
R8337
R8336
R8330
R8328
R8111
D8103
D8106
R8102
Q8114
R8113
Q8111
R8112
I8131
R8133
D8132
D8133
C8103
L8106
C8136
R8136
R8132
R8131
D8131
D8138
R8124
R8126
R8138
C8131
R8123
C8123
R8122
R8121
C8107
D8121
C8121
C8122
D8114
C8118
D8111
D8112
C8111
R8217
R8213
R8220
R8211
R8216
R8218
R8202
R8222
R8204
Q8202
R8205
C8217
D8202
D8204
D8201
R8207
R8219

Ltpl. Bedienteil 88226D Lötseite **Control Unit P.C.B 88226D** Solder side


an,to Signal Board
R3002
0R
R3003
0R
U12
W3201
ws
MP4
MP5
CUTOFF
C3354
100p
R3354
0R
D3354
LL4148
D3351
SD103C
D3341
LL4148
C3342
470u
D3342
LL4148
Q3341
BC857BW
R3341
10k
R3344
47k
R3343
10k
Q3343
BC847BW
C3341
10n
C3351
1000u
R3342
100k
R3006
0R
R3008
0R
C3182
10p
Q3181
BC847BW
R3181
100R
R3185
1k
R3365
100R
R3389
100R
R3186
820R
R3391
4k7
R3393
4k7
R3348
0R
L3392
10u
L3393
10u
C3392
15p
C3398
33p
C3399
15p
R3397
680R
D3391
LL4148
D3393
BAV103
R3392
1k
R3394
82k
L3398
10u
R3398
560R
Uvid
C3397
100n
Q3396
BFN22
C3393
100n
R3396
47k
R3359
10R
C3396
4n7
D3396
LL4148
R3399
10R
R3375
100R
R3390
100R
R3352
1k8
1%
C3394
100n
I3391
R
TDA6111
C3172
10p
Q3171
BC847BW
R3171
100R
C3161
100n
R3175
1k
R3176
820R
R3381
4k7
R3383
4k7
R3347
0R
L3382
10u
L3383
10u
C3382
15p
C3388
33p
C3389
15p
R3387
680R
D3381
LL4148
D3383
BAV103
R3382
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R3384
82k
L3388
10u
R3388
560R
C3387
100n
Q3386
BFN22
C3383
100n
R3386
47k
R3358
10R
C3386
4n7
D3386
LL4148
C3162
10p
Q3161
BC847BW
R3161
100R
C3181
100n
R3380
100R
C3384
100n
R3165
1k
R3166
820R
I3381
G
TDA6111
C3202
68p
C3201
68p
C3203
68p
C3208
47n
R3207
18k
R3379
10R
R3371
4k7
R3373
4k7
R3346
0R
L3372
10u
L3373
10u
C3372
15p
C3378
33p
C3379
15p
R3377
680R
D3371
LL4148
D3373
BAV103
R3372
1k
R3374
82k
R3378
560R
L3378
10u
C3377
100n
Q3376
BFN22
C3373
100n
R3376
47k
R3357
10R
C3376
4n7
D3376
LL4148
C3204
68p
R3208
1k5
R3209
12k
R3206
3k9
Q3204
BC847BW
Q3211
BC857BW
R3204
120R
R3212
33R
R3211
220R
C3210
100n
R3353
430R
C3352
470u
R3370
100R
C3374
100n
C3375
10n
I3371
B
TDA6111
C3212
820p
R3156
33R
C3158
470u
Q3157
BC856BW
R3218
220R
R3215
10R
C3221
22n
C3222
22n
R3221
680R
R3229
1R
C3156
100n
R3153
3R3
C3154
22u
Q3221
BC640
C3157
100n
N60
D3218
BA592
D3219
BA592
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12k
R3222
56k
R3225
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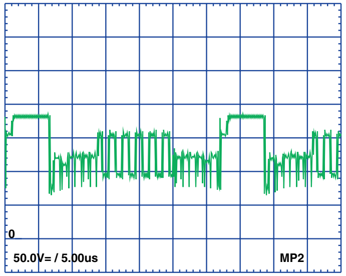
L3226
2x33u
R3227
470R
R3226
470R
Q3216
BC847BW
R3217
12k
R3216
12k
C3216
47n
R3219
10R
C3219
100n
R3223
56k
Q3222
BC639
C3223
10n
R3224
680R
R3228
1R
W3258
natur
SVM
an Booster-Spule
to Booster coil
SVM Modul
Scan velocity modulator
an,to W548 Basic Board
W3301
5pol. ws
W3001
nicht bestueckt
L3366
4u7
R3366
270R
R3364
10R
Uvid
C3366
22u
Uf
MP1
MP2
MP3
R
G
B
V3001
FOCUS1
FOCUS2
R3367
1M
C3367
22u
R3362
1k5
R3368
1k5
E3001
UG2
C3368
1n
C3360
10n
D3367
1N4007
Ausschaltblitzunterdrueckung
Interrupting flash suppression
Bruecken und Null-Ohm-Chips
Netz
TP
Bauteil
N75
MC
GND
N25
N121
N54
N73
N118
59
19
17
107
108
7
73
52
B3002
B3301
B3302
B3303
B3304
R3200
0R
R3205
0R
R3210
0R
34
99
32
2
103
48
81
87
B3003
R3199
0R
32
46

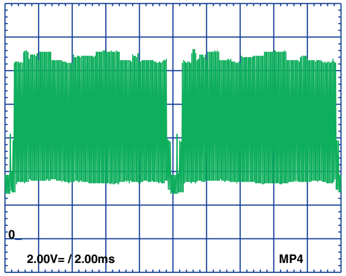
10.12.01 Ex
19.12.01 Ri

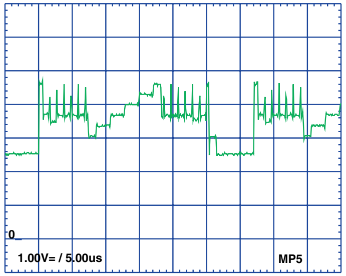
Benennung: LOEWE.
Bildrohrplatte
Picture CRT board
Q2500
Variante: 060/062

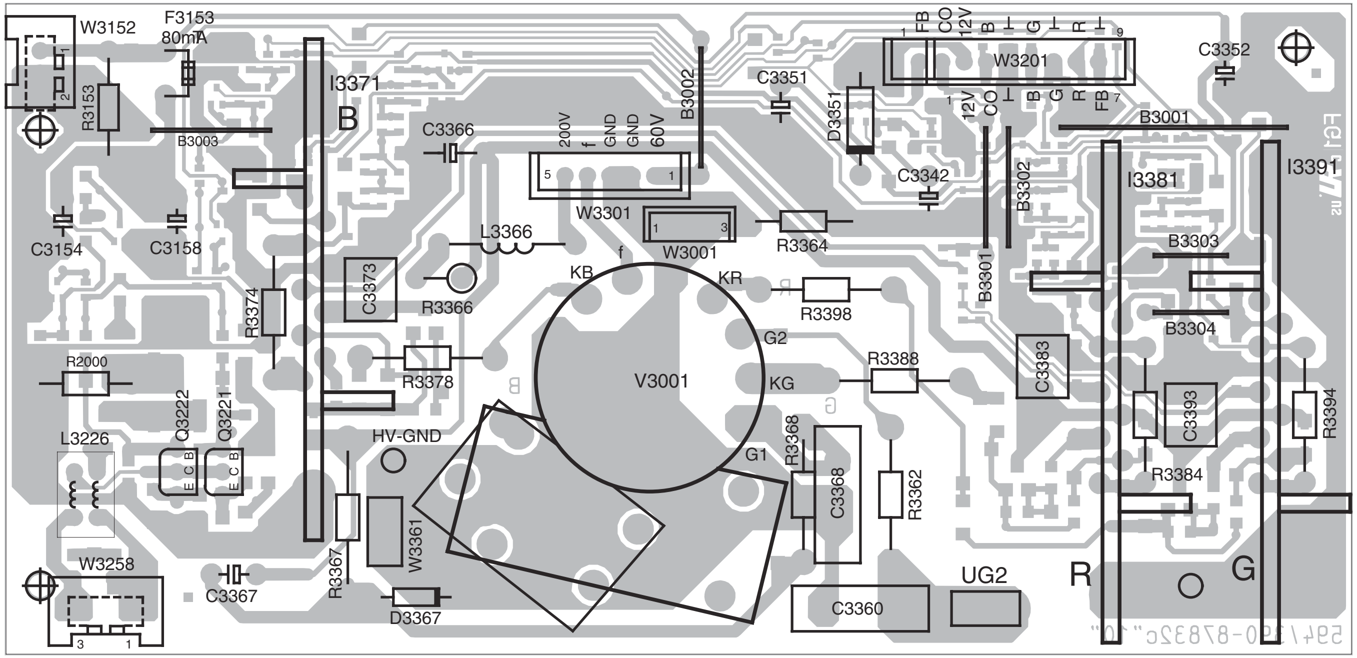
Code-Teile-Nr. Lpl.: 594/390-87832
Index c

erst.: Sabew
Datum: 10.12. 1
gepr.: Partheym.
Datum:





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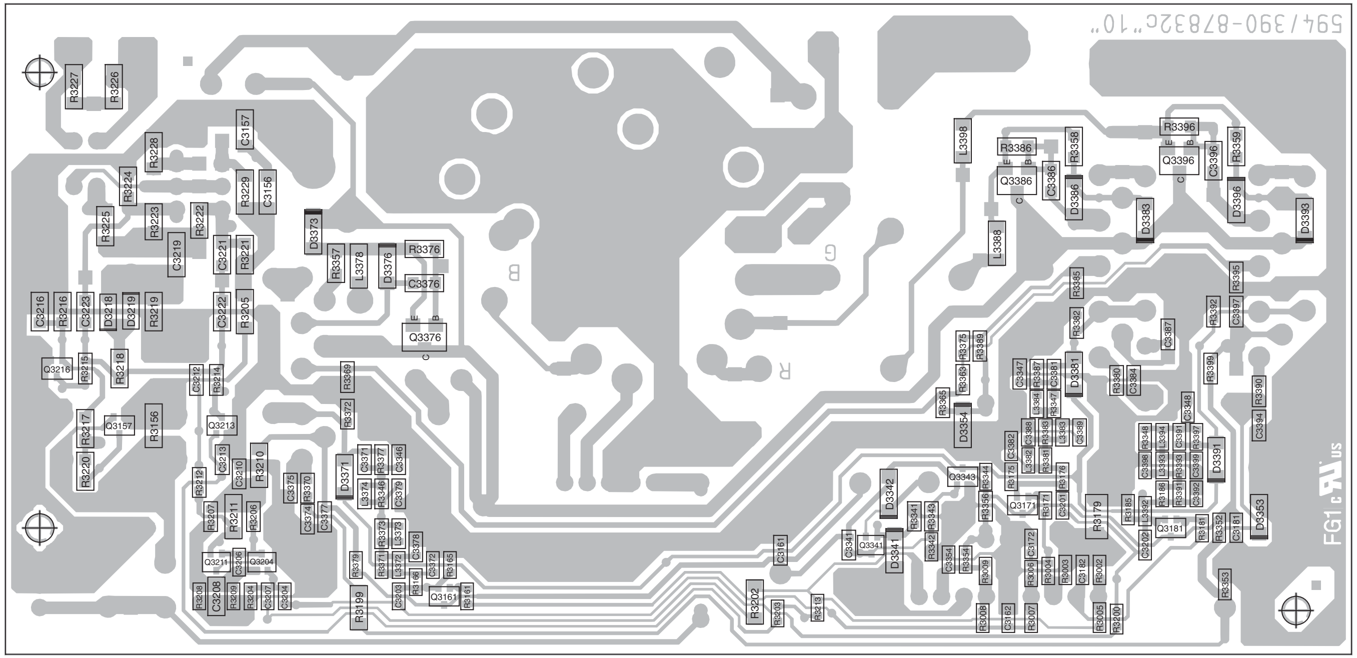
80mA
R3153
I3371
B
B3003
C3366
200V
f
GND
GND
60V
B3002
C3351
D3351
FB
CO
12V
B
⊥
G
⊥
R
⊥
W3201
12V
CO
⊥
B
G
R
FB
C3352
B3001
C3342
B3302
I3381
I3391
W3301
W3001
R3364
L3366
C3154
C3158
R3374
C3373
R3366
f
KB
KR
R3398
B3301
B3303
B3304
G2
R3388
C3383
V3001
KG
R3378
R2000
Q3222
Q3221
L3226
HV-GND
C3393
R3394
R3384
R3368
C3368
R3362
G1
W3361
R3367
C3367
D3367
W3258
C3360
UG2
R
G
594/390-87832c"10"
FG1

Ltpl. Bildrohrplatte 87832C
Bestückungsseite

CRT P.C.B 87832C
Components side


594/390-87832c"10"
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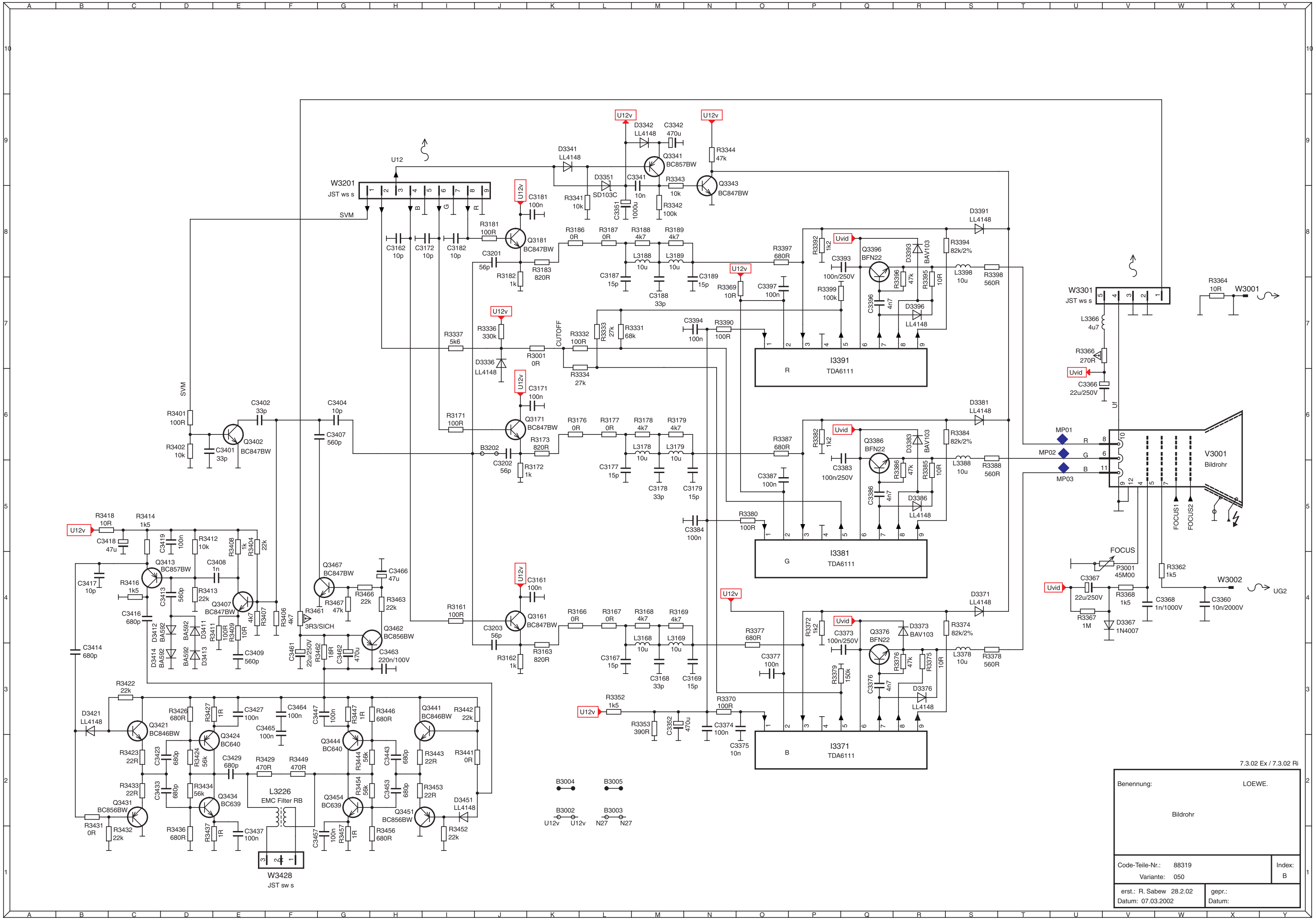
C3157
R3228
R3224
R3229
C3156
R3225
R3223
R3222
D3373
C3219
C3221
R3221
R3357
L3378
D3376
R3376
C3376
Q3376
C3216
R3216
C3223
D3218
D3219
R3219
C3222
R3205
Q3216
R3215
R3218
C3212
R3214
R3369
R3217
Q3157
R3156
Q3213
R3372
R3220
C3213
R3210
D3371
C3371
R3377
C3346
R3212
C3210
C3375
R3370
R3207
R3211
R3206
C3374
C3377
C3379
Q3211
Q3204
R3379
R3373
L3373
C3378
R3208
C3209
R3219
R3204
C3207
C3204
R3199
C3203
R3371
L3372
R3166
C3372
R3165
Q3161
R3161
C3161
R3202
R3203
R3218
L3398
R3386
R3358
R3396
Q3396
C3396
R3359
Q3386
C3386
D3386
D3383
D3396
D3393
L3388
R3385
R3395
R3382
R3392
C3397
R3375
R3389
C3387
R3383
D3381
R3380
C3384
R3399
R3390
R3365
D3354
C3348
C3394
D3342
Q3343
D3391
R3179
Q3171
R3185
D3353
Q3181
C3341
Q3341
R3341
R3343
R3342
D3341
R3354
R3009
R3008
C3182
R3007
R3003
R3002
R3005
R3200
R3181
R3182
C3181
R3353
FG1

Ltpl. Bildrohrplatte 87832C
Lötseite

CRT P.C.B 87832C
Solder side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JST ws s
U12
SVM
U12v
D3341
LL4148
D3342
LL4148
C3342
470u
Q3341
BC857BW
R3344
47k
D3351
SD103C
C3341
10n
R3343
10k
Q3343
BC847BW
R3341
10k
C3351
1000u
R3342
100k
C3181
100n
R3181
100R
Q3181
BC847BW
C3162
10p
C3172
10p
C3182
10p
C3201
56p
R3183
820R
R3182
1k
R3186
0R
R3187
0R
R3188
4k7
R3189
4k7
L3188
10u
L3189
10u
C3187
15p
C3188
33p
C3189
15p
R3397
680R
R3392
1k2
Uvid
C3393
100n/250V
Q3396
BFN22
D3393
BAV103
R3394
82k/2%
D3391
LL4148
R3396
47k
R3395
10R
L3398
10u
R3398
560R
R3399
100k
C3396
4n7
D3396
LL4148
R3369
10R
C3397
100n
C3394
100n
R3390
100R
I3391
R
TDA6111
R3337
5k6
R3336
330k
D3336
LL4148
R3001
0R
CUTOFF
R3332
100R
R3333
27k
R3331
68k
R3334
27k
C3171
100n
R3171
100R
Q3171
BC847BW
R3176
0R
R3177
0R
R3178
4k7
R3179
4k7
L3178
10u
L3179
10u
C3177
15p
C3178
33p
C3179
15p
B3202
C3202
56p
R3173
820R
R3172
1k
R3387
680R
R3382
1k2
C3383
100n/250V
Q3386
BFN22
D3383
BAV103
R3384
82k/2%
D3381
LL4148
R3386
47k
R3385
10R
L3388
10u
R3388
560R
C3386
4n7
D3386
LL4148
C3387
100n
C3384
100n
R3380
100R
I3381
G
TDA6111
C3161
100n
R3161
100R
Q3161
BC847BW
C3203
56p
R3163
820R
R3162
1k
R3166
0R
R3167
0R
R3168
4k7
R3169
4k7
L3168
10u
L3169
10u
C3167
15p
C3168
33p
C3169
15p
R3377
680R
R3372
1k2
C3373
100n/250V
Q3376
BFN22
D3373
BAV103
R3374
82k/2%
D3371
LL4148
R3376
47k
R3375
10R
L3378
10u
R3378
560R
R3379
150k
C3376
4n7
D3376
LL4148
C3377
100n
R3352
1k5
R3353
390R
C3352
470u
R3370
100R
C3374
100n
C3375
10n
I3371
B
TDA6111
W3301
JST ws s
L3366
4u7
R3366
270R
C3366
22u/250V
Uf
R3364
10R
W3001
MP01
MP02
MP03
R
G
B
V3001
Bildrohr
FOCUS1
FOCUS2
FOCUS
P3001
45M00
C3367
22u/250V
R3367
1M
R3368
1k5
D3367
1N4007
C3368
1n/1000V
R3362
1k5
W3002
C3360
10n/2000V
UG2
R3401
100R
R3402
10k
C3401
33p
Q3402
BC847BW
C3402
33p
C3404
10p
C3407
560p
R3418
10R
R3414
1k5
C3418
47u
C3419
100n
R3412
10k
R3408
1k
R3404
22k
Q3413
BC857BW
C3408
1n
C3417
10p
R3416
1k5
C3413
560p
R3413
22k
Q3407
BC847BW
C3416
680p
D3412
BA592
D3414
BA592
BA592
BA592
D3411
D3413
R3411
100R
R3409
10R
R3407
4k7
R3406
4k7
C3409
560p
C3414
680p
Q3467
BC847BW
C3466
47u
R3466
22k
R3467
47k
R3463
22k
R3461
3R3/SICH
Q3462
BC856BW
C3461
22u/250V
R3462
18R
C3462
470u
C3463
220n/100V
R3422
22k
D3421
LL4148
Q3421
BC846BW
R3426
680R
R3427
1R
C3427
100n
C3464
100n
C3465
100n
C3447
100n
R3447
1R
R3446
680R
Q3441
BC846BW
R3442
22k
Q3424
BC640
Q3444
BC640
R3423
22R
C3423
680p
R3424
56k
C3429
680p
R3429
470R
R3449
470R
R3444
56k
C3443
680p
R3443
22R
R3441
0R
R3433
22R
C3433
680p
R3434
56k
Q3434
BC639
L3226
EMC Filter RB
Q3454
BC639
R3454
56k
C3453
680p
R3453
22R
D3451
LL4148
Q3431
BC856BW
Q3451
BC856BW
R3431
0R
R3432
22k
R3436
680R
R3437
1R
C3437
100n
C3457
100n
R3457
1R
R3456
680R
R3452
22k
W3428
JST sw s
B3004
B3005
B3002
U12v
U12v
B3003
N27
N27
A B C D E F G H I J K L M N O P Q R S T U V W X Y
1 2 3 4 5 6 7 8 9 10

7.3.02 Ex / 7.3.02 Ri

Benennung: LOEWE.

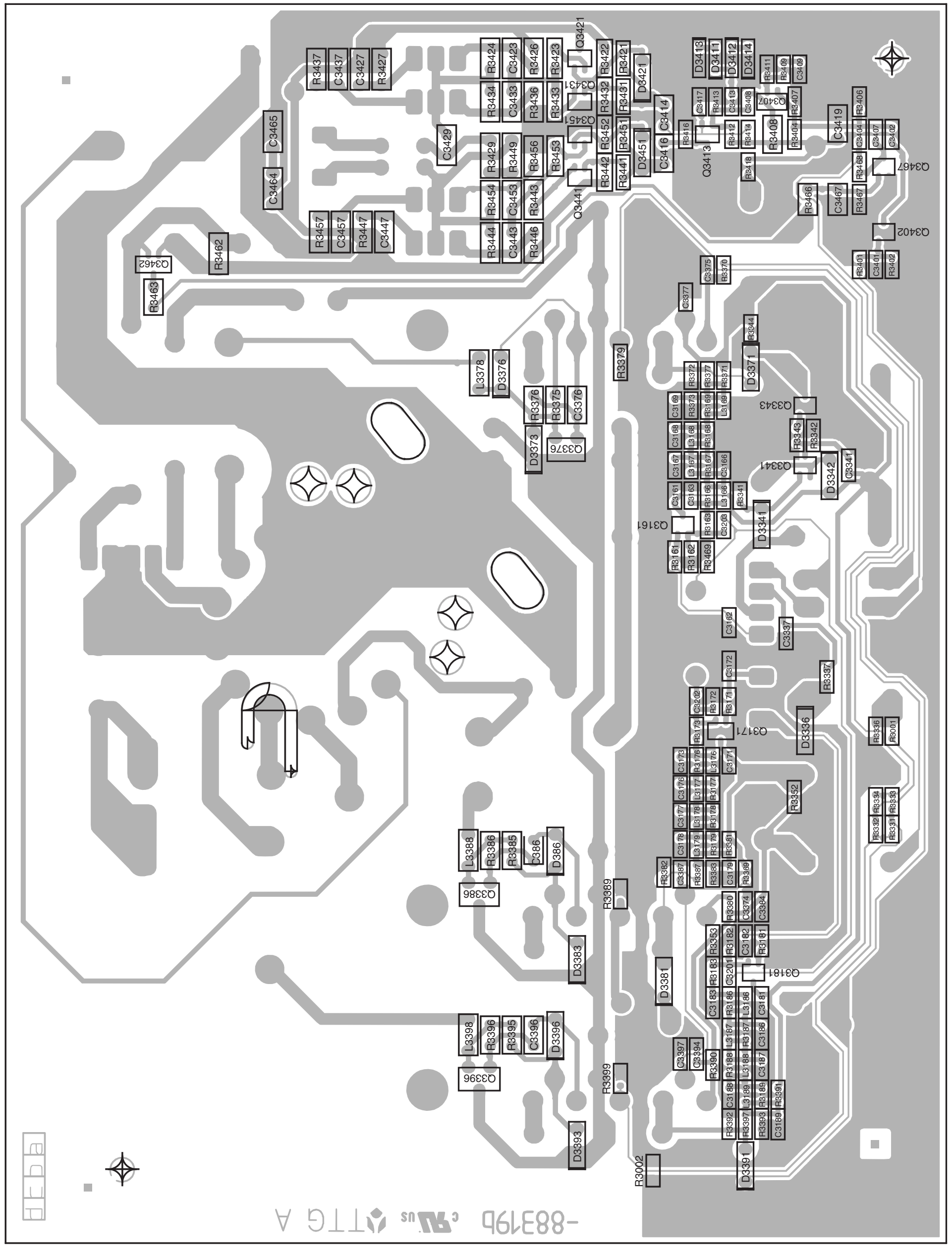
Bildrohr

Code-Teile-Nr.: 88319
Variante: 050

Index: B

erst.: R. Sabew 28.2.02
Datum: 07.03.2002

gepr.:
Datum:


-88319b
TTG A
R3437
C3437
C3427
R3427
R3424
C3423
R3426
R3423
R3422
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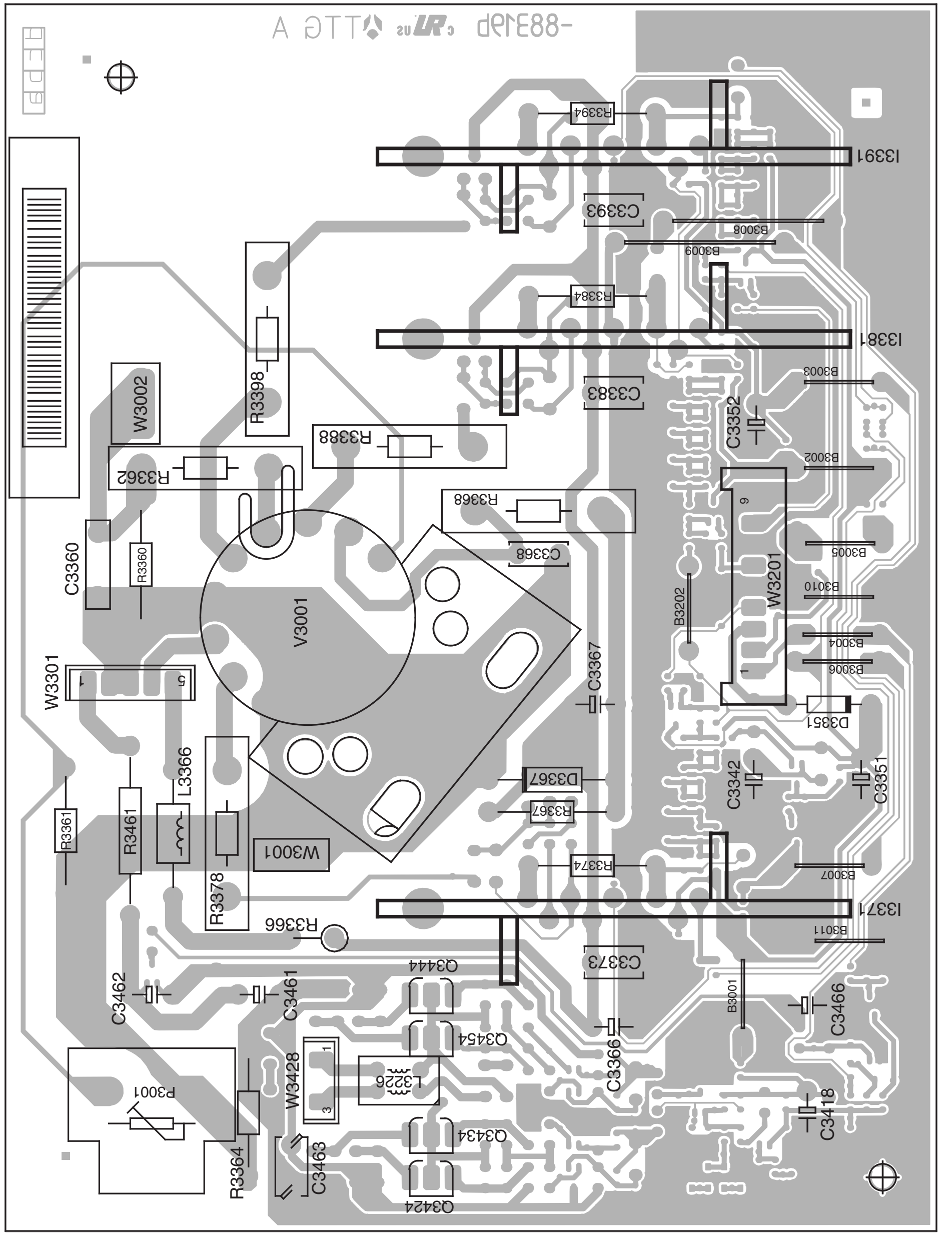
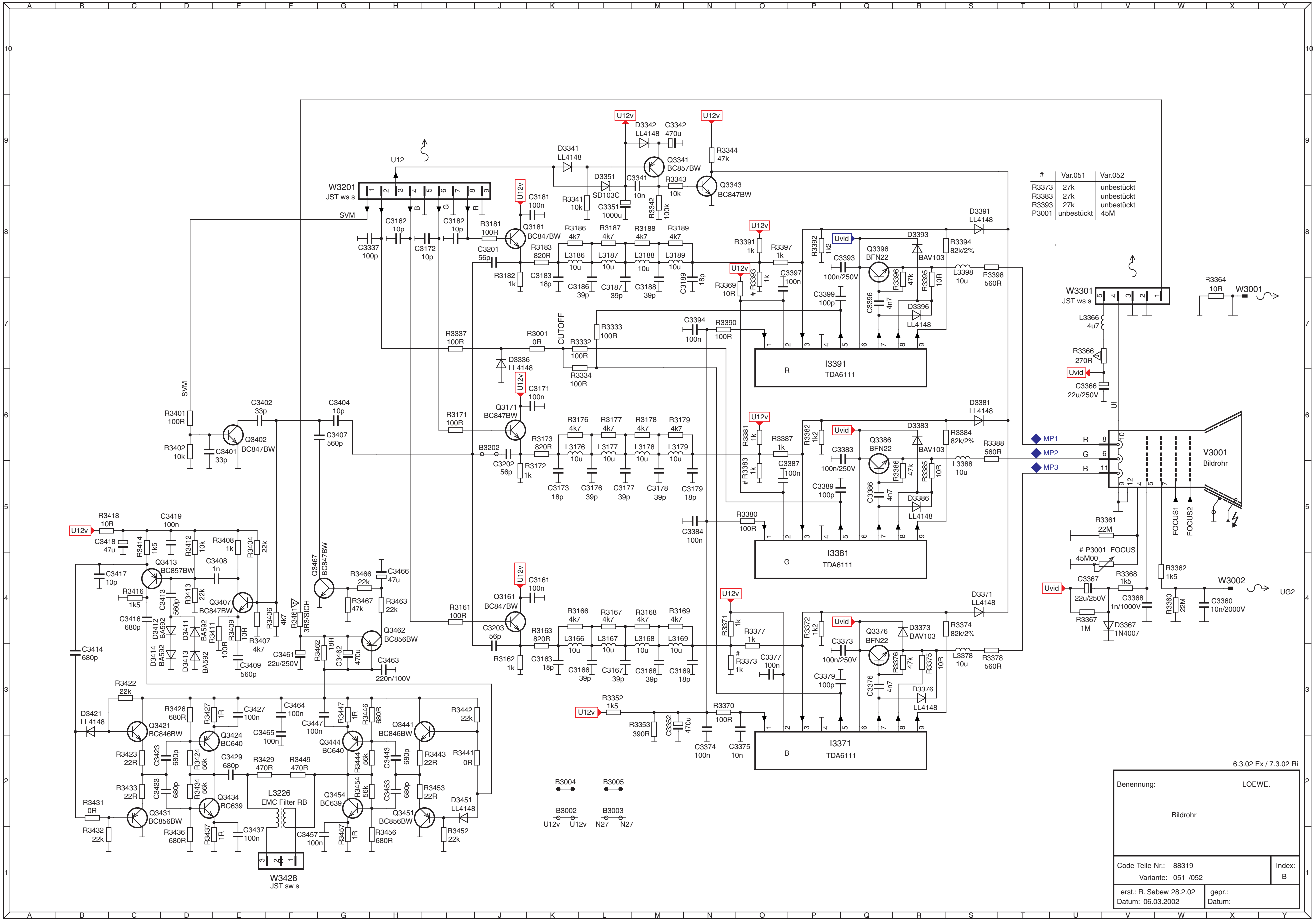
D3421
Q3421
D3413
D3411
D3412
D3414
C3465
C3464
C3429
R3457
C3457
R3447
C3447
R3444
C3443
R3446
R3462
Q3462
R3463
R3379
L3378
D3376
R3376
R3375
C3376
D3373
Q3376
Q3161
D3341
D3342
Q3341
Q3343
D3371
Q3171
D3336
R3392
L3388
R3386
R3385
C386
D386
Q3386
R3389
D3383
D3381
Q3181
L3396
R3396
R3395
C3396
D3396
Q3396
R3399
D3393
R3002
D3391
Q3402
Q3467
C3419
C3467
R3466
R3408
Q3413
Q3441
Q3461
Q3431
D3451
C3414
C3416

Bildrohrleiterplatte 88319B Lötseite • **CRT P.C.B 88319B** Solder side


-88319b
TTG A
R3394
I3391
C3393
B3008
B3009
R3384
I3381
C3383
B3003
C3352
B3002
W3002
R3398
R3388
R3362
R3368
C3368
C3360
R3360
V3001
B3005
B3010
B3202
W3201
B3004
B3006
C3367
W3301
D3351
D3367
R3367
C3342
C3351
L3366
R3361
R3461
W3001
R3374
B3007
R3378
I3371
R3366
B3011
C3373
Q3444
C3462
C3461
B3001
C3466
C3366
Q3454
W3428
L3226
P3001
C3418
R3364
C3463
Q3434
Q3424

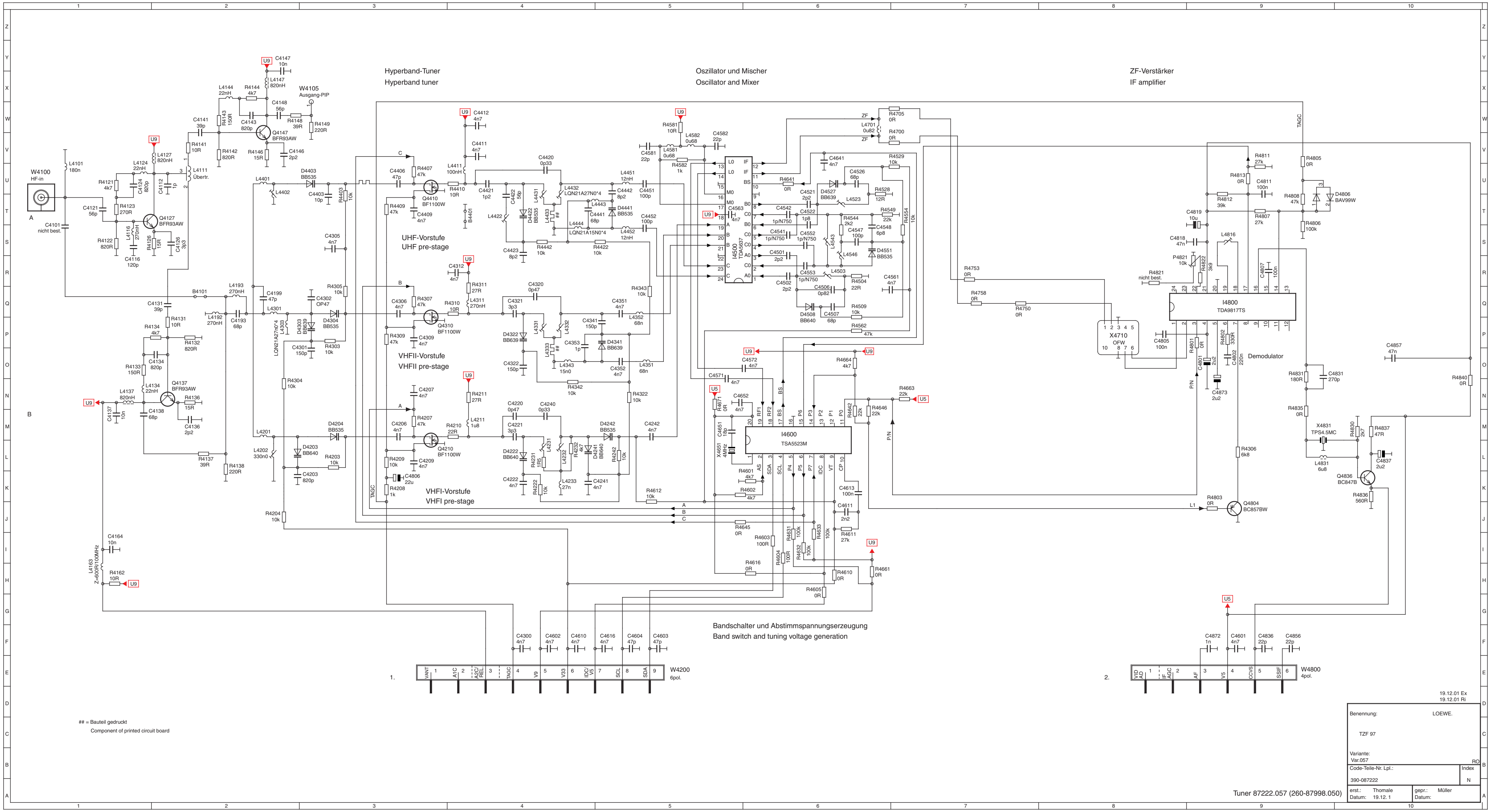
Bildrohrleiterplatte 88319B Bestückungsseite • **CRT P.C.B 88319B** Components side


W3201
JST ws s
U12
SVM
B
G
R
C3337 100p
C3162 10p
C3172 10p
C3182 10p
C3181 100n
U12v
Q3181 BC847BW
R3181 100R
R3183 820R
R3182 1k
C3183 18p
C3201 56p
R3186 4k7
R3187 4k7
R3188 4k7
R3189 4k7
L3186 10u
L3187 10u
L3188 10u
L3189 10u
C3186 39p
C3187 39p
C3188 39p
C3189 18p
D3341 LL4148
D3342 LL4148
C3342 470u
Q3341 BC857BW
D3351 SD103C
C3341 10n
R3341 10k
C3351 1000u
R3342 100k
R3343 10k
R3344 47k
Q3343 BC847BW
R3391 1k
R3397 1k
R3393 1k
R3369 10R
C3397 100n
R3392 1k2
Uvid
C3393 100n/250V
Q3396 BFN22
D3393 BAV103
R3394 82k/2%
D3391 LL4148
C3399 100p
C3396 4n7
R3396 47k
R3395 10R
D3396 LL4148
L3398 10u
R3398 560R
R3337 100R
R3001 0R
CUTOFF
R3332 100R
R3333 100R
R3334 100R
D3336 LL4148
C3394 100n
R3390 100R
I3391 TDA6111
C3171 100n
Q3171 BC847BW
R3171 100R
R3401 100R
R3402 10k
Q3402 BC847BW
C3401 33p
C3402 33p
C3404 10p
C3407 560p
B3202
C3202 56p
R3173 820R
R3172 1k
R3176 4k7
R3177 4k7
R3178 4k7
R3179 4k7
L3176 10u
L3177 10u
L3178 10u
L3179 10u
C3173 18p
C3176 39p
C3177 39p
C3178 39p
C3179 18p
R3381 1k
R3383 1k
R3387 1k
C3387 100n
R3382 1k2
C3383 100n/250V
Q3386 BFN22
D3383 BAV103
R3384 82k/2%
D3381 LL4148
C3389 100p
C3386 4n7
R3386 47k
R3385 10R
D3386 LL4148
L3388 10u
R3388 560R
C3384 100n
R3380 100R
I3381 TDA6111
MP1
MP2
MP3
V3001 Bildrohr
FOCUS1
FOCUS2
W3301 JST ws s
L3366 4u7
R3366 270R
C3366 22u/250V
Uf
R3364 10R
W3001
R3361 22M
P3001 45M00 FOCUS
R3368 1k5
C3367 22u/250V
R3367 1M
D3367 1N4007
C3368 1n/1000V
R3362 1k5
R3360 22M
C3360 10n/2000V
W3002
UG2
R3418 10R
C3418 47u
C3419 100n
R3414 1k5
R3412 10k
R3408 1k
R3404 22k
Q3413 BC857BW
C3408 1n
C3417 10p
R3416 1k5
C3413 560p
R3413 22k
Q3407 BC847BW
C3416 680p
D3412 BA592
D3411 BA592
D3414 BA592
D3413 BA592
R3411 100R
R3409 10R
R3407 4k7
R3406 4k7
C3409 560p
R3461 3R3/SICH
C3414 680p
Q3467 BC847BW
R3466 22k
C3466 47u
R3467 47k
R3463 22k
Q3462 BC856BW
C3461 22u/250V
R3462 18R
C3462 470u
C3463 220n/100V
C3161 100n
Q3161 BC847BW
R3161 100R
C3203 56p
R3163 820R
R3162 1k
C3163 18p
R3166 4k7
R3167 4k7
R3168 4k7
R3169 4k7
L3166 10u
L3167 10u
L3168 10u
L3169 10u
C3166 39p
C3167 39p
C3168 39p
C3169 18p
R3371 1k
R3377 1k
R3373 1k
C3377 100n
R3372 1k2
C3373 100n/250V
Q3376 BFN22
D3373 BAV103
R3374 82k/2%
D3371 LL4148
C3379 100p
C3376 4n7
R3376 47k
R3375 10R
D3376 LL4148
L3378 10u
R3378 560R
R3352 1k5
R3353 390R
C3352 470u
R3370 100R
C3374 100n
C3375 10n
I3371 TDA6111
R3422 22k
D3421 LL4148
Q3421 BC846BW
R3426 680R
R3427 1R
C3427 100n
C3464 100n
C3447 100n
R3447 1R
R3446 680R
Q3441 BC846BW
R3442 22k
Q3424 BC640
C3465 100n
Q3444 BC640
R3423 22R
C3423 680p
R3424 56k
C3429 680p
R3429 470R
R3449 470R
R3444 56k
C3443 680p
R3443 22R
R3441 0R
R3433 22R
C3433 680p
R3434 56k
L3226 EMC Filter RB
Q3454 BC639
R3454 56k
C3453 680p
R3453 22R
D3451 LL4148
R3431 0R
Q3431 BC856BW
Q3434 BC639
Q3451 BC856BW
R3432 22k
R3436 680R
R3437 1R
C3437 100n
C3457 100n
R3457 1R
R3456 680R
R3452 22k
W3428 JST sw s
B3004
B3005
B3002
B3003
U12v
N27

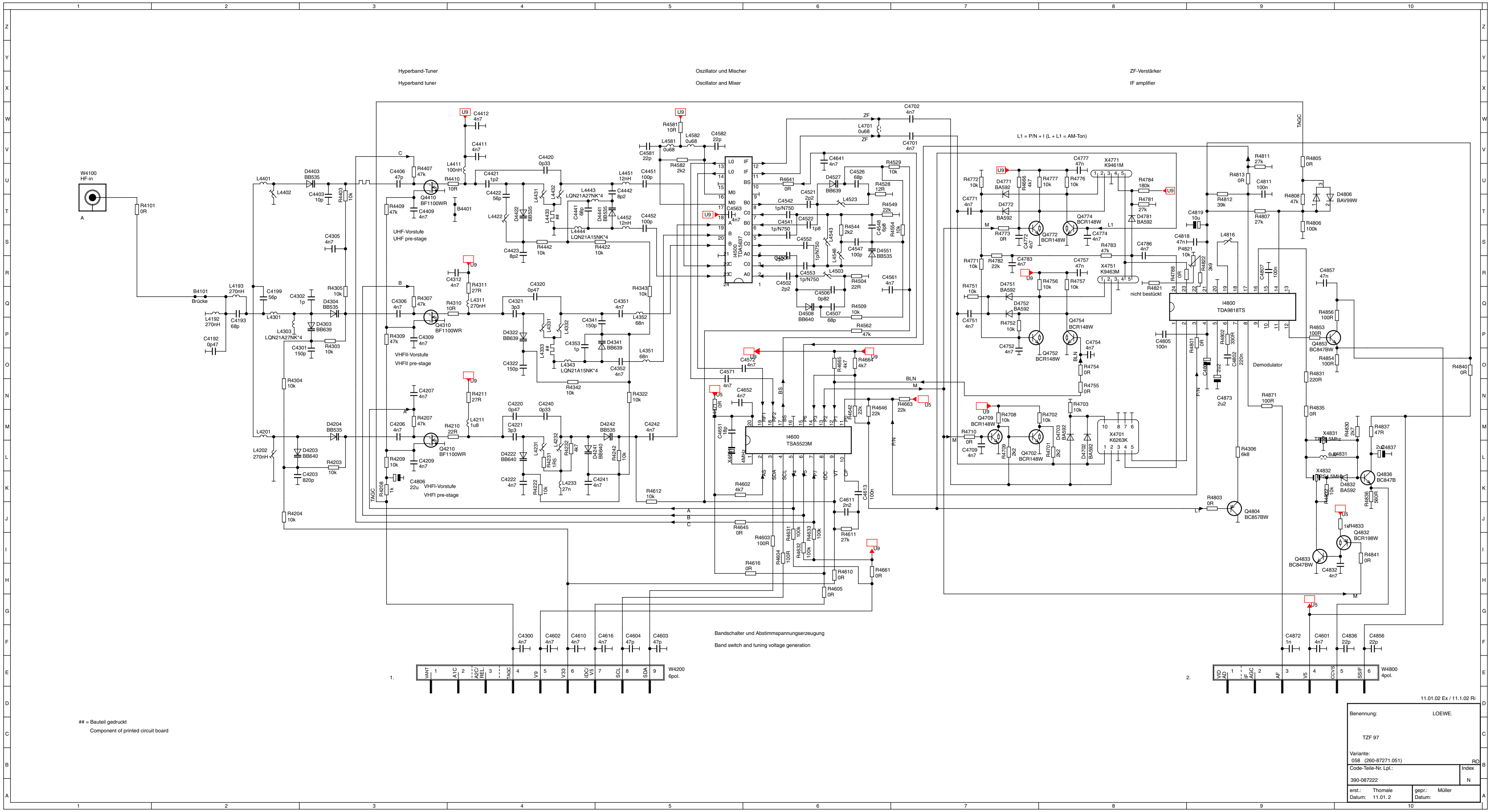
#	Var.051	Var.052
R3373	27k	unbestückt
R3383	27k	unbestückt
R3393	27k	unbestückt
P3001	unbestückt	45M

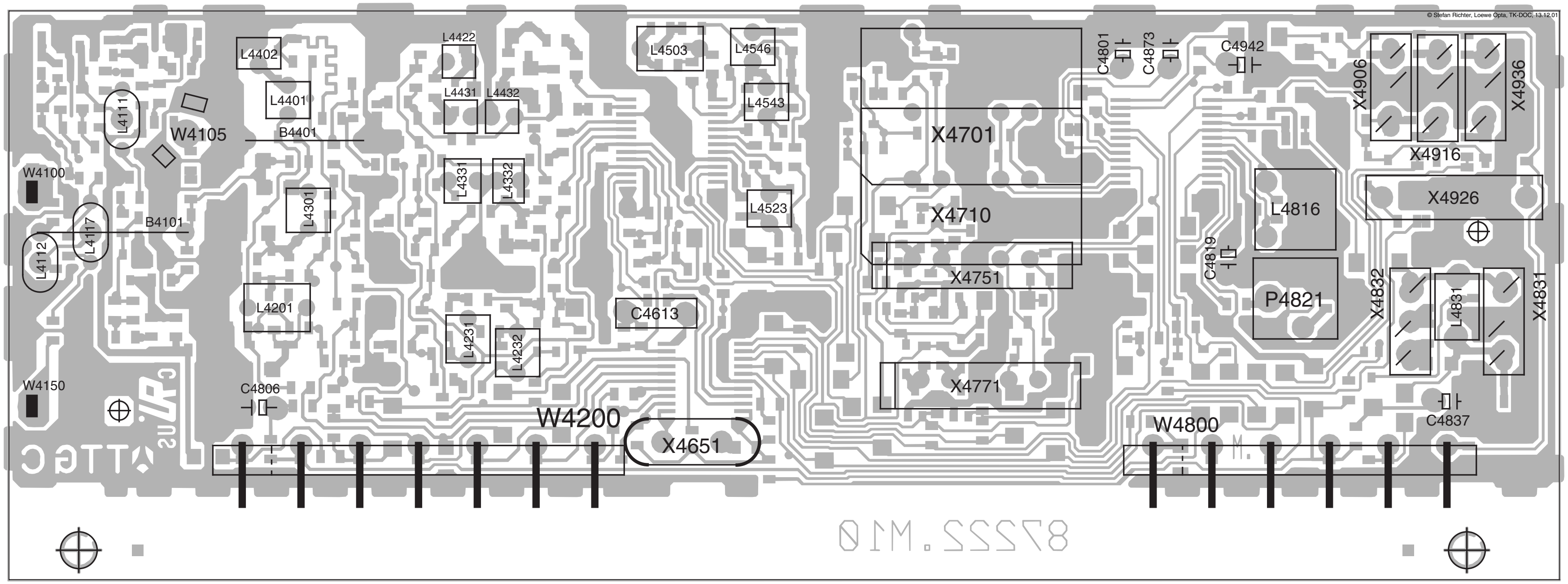
6.3.02 Ex / 7.3.02 Ri

Benennung:	LOEWE.	
Bildrohr		
Code-Teile-Nr.: 88319 Variante: 051 /052		Index: B
erst.: R. Sabew 28.2.02 Datum: 06.03.2002	gepr.: Datum:	


Hyperband-Tuner
Hyperband tuner
Oszillator und Mischer
Oscillator and Mixer
ZF-Verstärker
IF amplifier
UHF-Vorstufe
UHF pre-stage
VHFII-Vorstufe
VHFII pre-stage
VHFI-Vorstufe
VHFI pre-stage
Bandschalter und Abstimmspannungserzeugung
Band switch and tuning voltage generation
Demodulator
W4100
HF-in
W4105
Ausgang-PIP
I4500
TDA5637
I4600
TSA5523M
I4800
TDA9817TS
X4710
OFW
X4651
4MHz
X4831
TPS4.5MC
Q4127
BFR93AW
Q4137
BFR93AW
Q4147
BFR93AW
Q4410
BF1100W
Q4310
BF1100W
Q4210
BF1100W
Q4804
BC857BW
Q4836
BC847B
D4806
BAV99W
W4200
6pol.
VANT
A1C
A2C/REL
TAGC
V9
V33
IDC/V5
SCL
SDA
W4800
4pol.
VID AD
IF AGC
AF
V5
CCVS
SSIF
1.
2.
U9
U5
TAGC
P/N
L1
A
B
C
ZF
nicht best.
## = Bauteil gedruckt
Component of printed circuit board
Tuner 87222.057 (260-87998.050)
19.12.01 Ex
19.12.01 Ri
Benennung:
LOEWE.
TZF 97
Variante:
Var.057
RO
Code-Teile-Nr. Lpl.:
390-087222
Index
N
erst.: Thomale
Datum: 19.12. 1
gepr.: Müller
Datum:

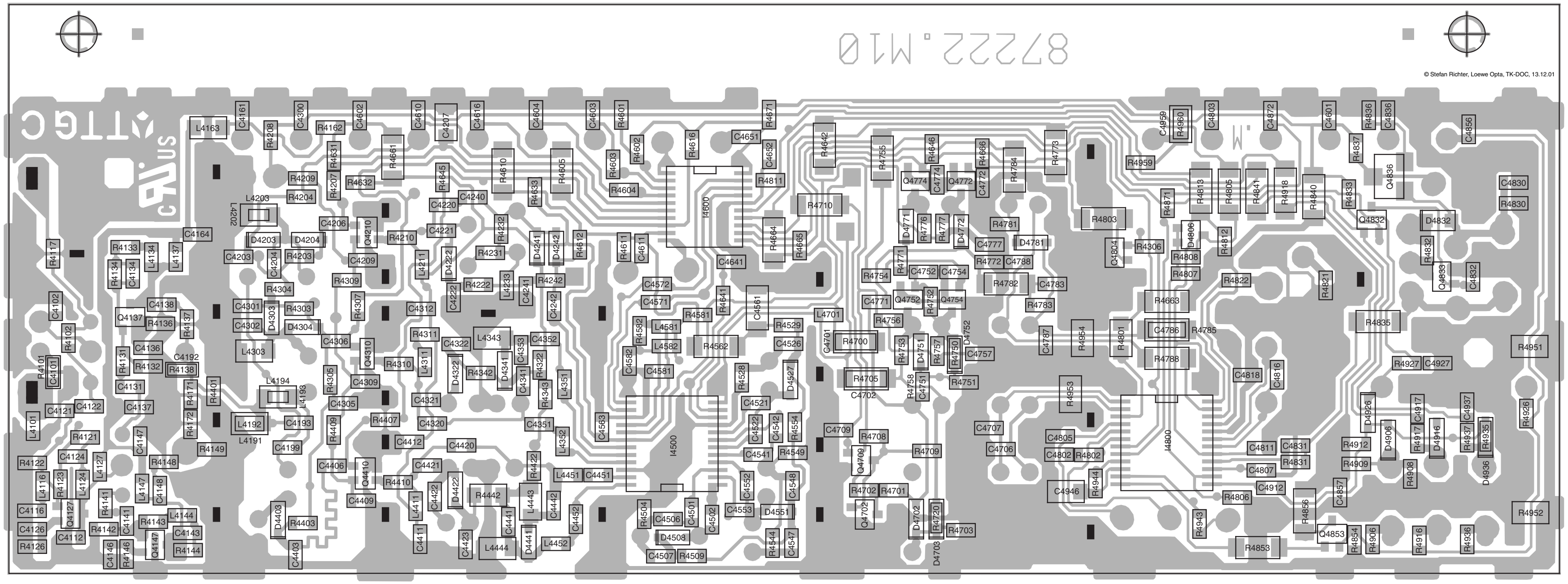
87222.057


Hyperband-Tuner
Hyperband tuner
Oszillator und Mischer
Oscillator and Mixer
ZF-Verstärker
IF amplifier
UHF-Vorstufe
UHF pre-stage
VHFII-Vorstufe
VHFII pre-stage
VHFI-Vorstufe
VHFI pre-stage
W4100
HF-in
I4500
TDA5637
I4600
TSA5523M
I4800
TDA9818TS
X4771
K9461M
X4751
K9463M
X4701
K6263K
Demodulator
L1 = P/N + I (L + L1 = AM-Ton)
nicht bestückt
Bandschalter und Abstimmspannungserzeugung
Band switch and tuning voltage generation
W4200
6pol.
W4800
4pol.
## = Bauteil gedruckt
Component of printed circuit board
11.01.02 Ex / 11.1.02 Ri
Benennung:
LOEWE.
TZF 97
Variante:
058 (260-87271.051)
RO
Code-Teile-Nr. Lpl.:
Index
390-087222
N
erst.: Thomale
Datum: 11.01. 2
gepr.: Müller
Datum:


© Stefan Richter, Loewe Opta, TK-DOC, 13.12.01
L4402
L4401
L4422
L4431
L4432
L4503
L4546
L4543
L4523
L4111
W4105
B4401
W4100
L4301
L4331
L4332
L4117
B4101
L4112
L4201
L4231
L4232
C4613
W4150
C4806
W4200
X4651
X4701
X4710
X4751
X4771
C4801
C4873
C4942
X4906
X4936
X4916
X4926
L4816
C4819
P4821
X4832
L4831
X4831
C4837
W4800
87222.M10

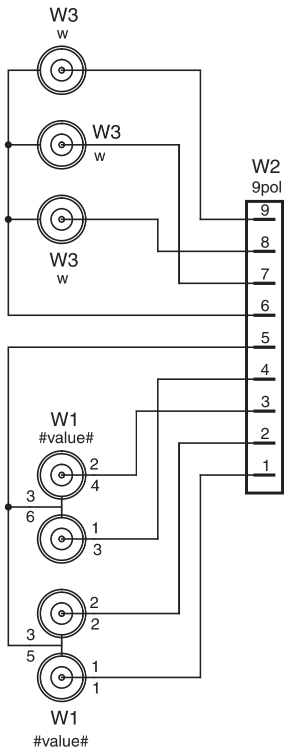
Ltpl. Tuner/ZF 87222M
Bestückungsseite

Tuner/IF P.C.B 87222M
Components side


87222.M10
© Stefan Richter, Loewe Opta, TK-DOC, 13.12.01
L4163
C4161
R4208
C4300
R4162
C4602
C4610
C4207
C4616
C4604
C4603
R4601
R4616
C4651
R4671
R4642
R4755
R4646
R4666
R4773
C4959
R4960
C4803
C4872
C4601
R4836
C4836
C4856
R4209
R4631
R4632
R4661
R4645
R4610
R4633
R4605
R4603
R4602
C4652
R4811
Q4774
C4774
Q4772
C4772
R4784
R4959
R4837
Q4836
C4830
R4830
L4203
L4202
R4204
R4207
C4220
C4240
R4604
R4710
R4871
R4813
R4805
R4841
R4918
R4840
R4833
Q4832
D4832
C4206
C4210
C4221
R4232
D4771
R4776
R4777
D4772
R4781
R4803
D4806
R4812
R4117
R4133
R4134
R4137
C4164
D4203
D4204
R4210
R4231
D4241
D4242
R4612
R4611
C4611
R4664
R4665
C4777
D4781
C4804
R4306
R4808
R4832
C4203
C4204
R4203
C4209
R4211
D4222
C4641
R4771
C4752
C4754
R4772
C4788
R4807
R4134
C4134
R4309
R4222
R4233
R4241
R4242
R4754
R4782
C4783
R4822
R4821
Q4833
C4832
C4102
R4304
C4222
C4242
C4572
C4571
C4771
Q4752
R4752
Q4754
R4783
R4663
C4138
C4301
R4303
R4307
C4312
R4581
R4641
C4561
R4529
C4701
R4756
C4786
R4785
R4835
Q4137
R4136
R4137
C4302
D4303
D4304
C4306
R4311
C4322
L4343
C4333
C4352
R4582
L4581
R4102
C4136
C4192
L4303
C4310
R4310
C4311
D4322
R4342
D4341
C4341
R4322
L4351
L4582
R4562
C4526
R4700
R4753
D4751
R4757
R4750
C4757
C4787
R4954
R4801
R4788
R4951
R4101
C4101
R4131
R4132
R4138
C4131
R4171
R4401
L4194
L4193
R4305
C4309
C4305
C4321
C4343
C4562
C4581
R4528
D4527
R4705
C4702
R4758
C4751
R4751
R4953
C4818
C4816
R4927
C4927
C4121
C4122
C4137
R4172
L4192
C4193
R4409
R4407
C4320
C4351
C4563
C4521
C4522
C4542
R4554
C4709
R4708
C4707
C4706
C4805
C4802
R4802
D4926
D4906
R4917
C4917
D4916
C4937
R4937
R4935
R4926
L4101
R4121
C4147
R4149
L4191
C4199
C4412
C4420
L4352
I4500
C4541
R4549
R4709
I4800
C4811
C4831
R4912
R4122
C4124
R4127
R4148
C4406
C4410
C4421
R4422
L4451
C4451
C4532
C4548
Q4709
C4807
R4831
R4909
R4908
D4936
L4116
R4123
C4124
R4141
L4147
C4148
C4409
R4410
C4422
D4422
R4442
L4443
C4442
R4702
R4701
C4946
R4944
R4806
C4912
R4856
C4857
C4116
C4126
R4126
Q4127
C4112
R4142
C4141
R4143
L4144
C4143
C4146
R4146
Q4147
R4144
D4403
R4403
C4403
C4411
C4423
C4441
D4441
L4444
L4452
C4452
R4504
C4506
C4501
C4502
C4553
D4551
D4508
C4507
R4509
R4544
C4547
Q4702
D4702
R4720
D4703
R4703
R4943
R4853
Q4853
R4854
R4906
R4916
R4936
R4952

Ltpl. Tuner/ZF 87222M
Lötseite

Tuner/IF P.C.B 87222M
Solder Side


W3
w
W3
w
W3
w
W2
9pol
9
8
7
6
5
4
3
2
1
W1
#value#
2
4
3
6
1
3
2
2
3
5
1
1
W1
#value#

15.3.02 Ex / 18.3.02 Ri

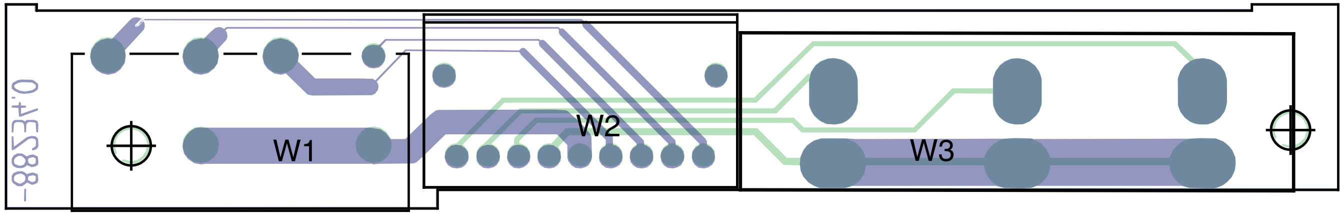
Benennung: LOEWE.

Q2500

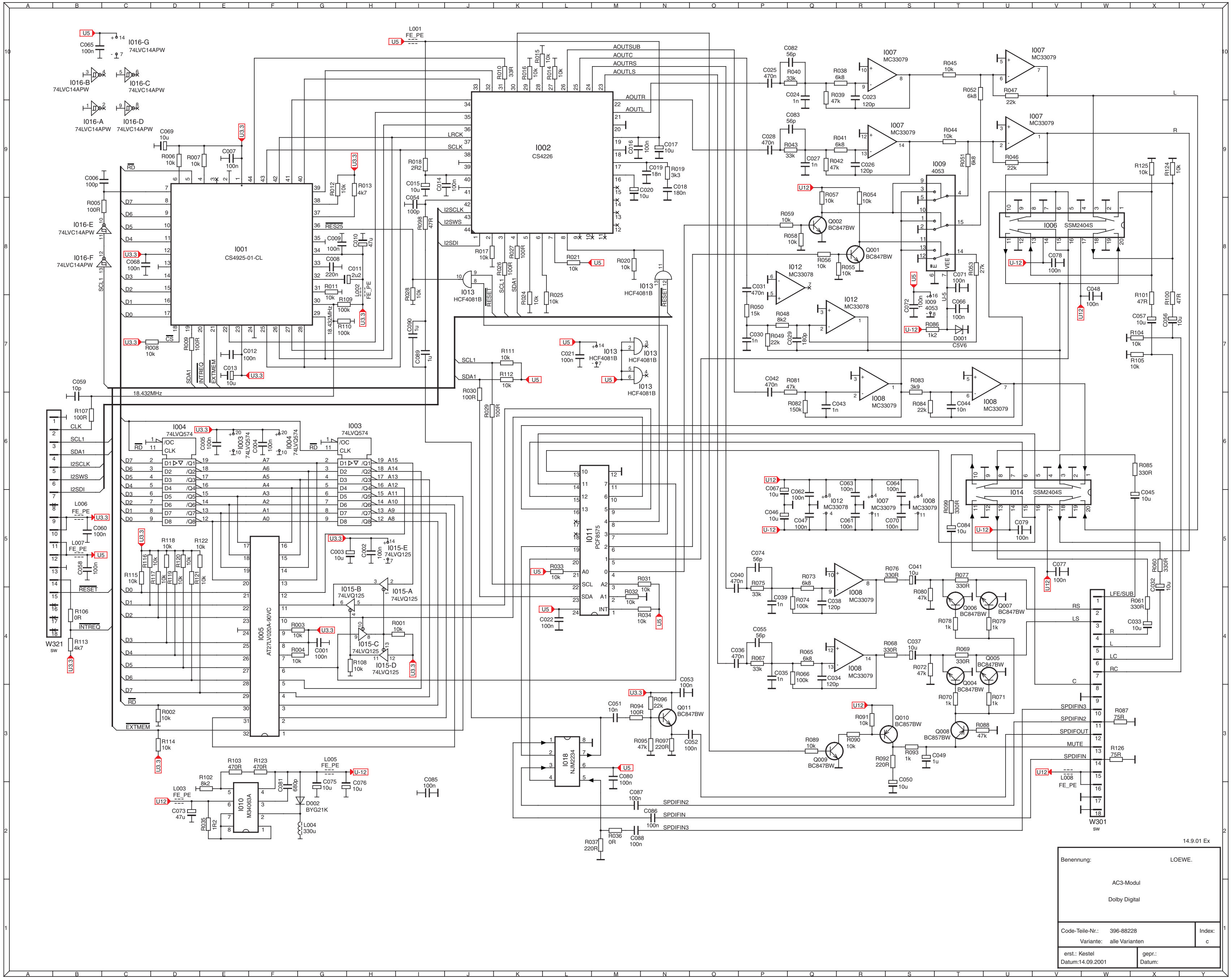
Audio-Erweiterung

Code-Teile-Nr.: 390-88234
Variante: 050
Index: -

erst.:R. Sabew
Datum: 15.03.2002
gepr.:
Datum:



Ltpl. Audio-Erweiterung 88234 Bestückungsseite
Audio Extension P.C.B 88234 Components side

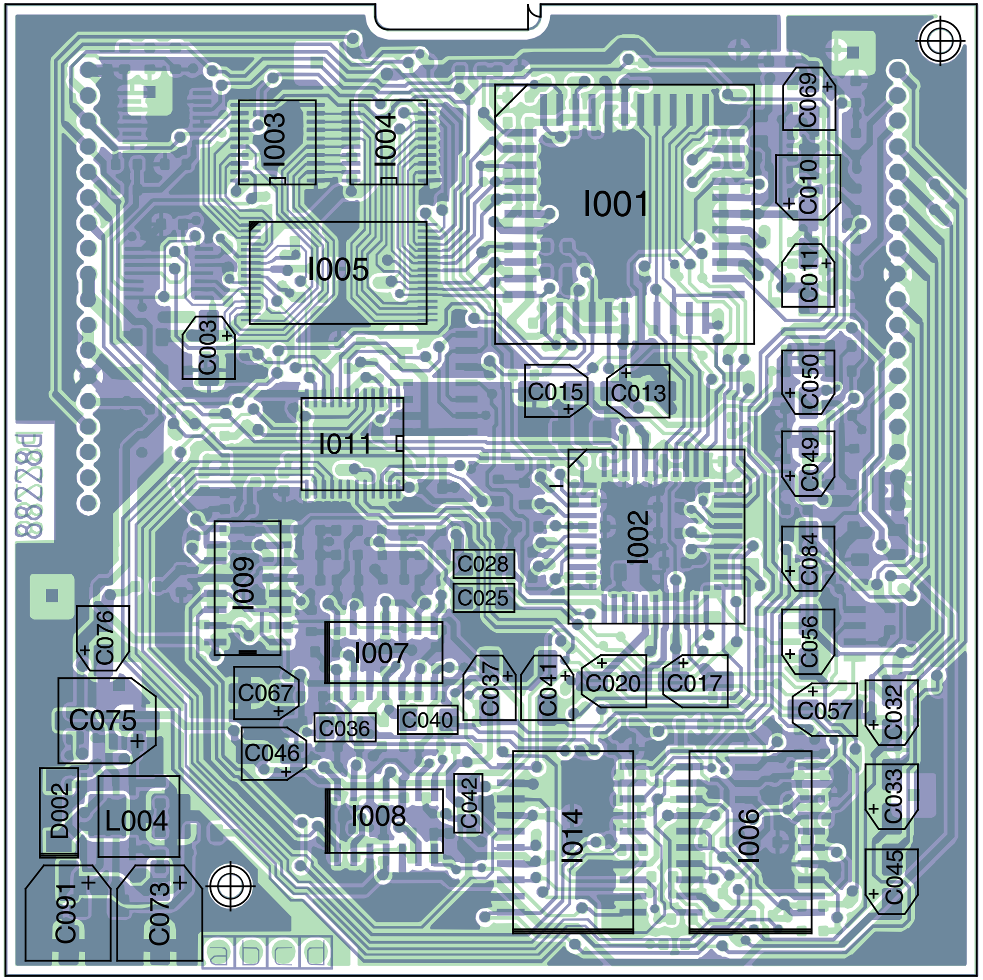

I001 CS4925-01-CL
I002 CS4226
I003 74LVQ574
I004 74LVQ574
I005 AT27LV020A-90VC
I006 SSM2404S
I007 MC33079
I008 MC33079
I009 4053
I010 MC34063A
I011 PCF8575
I012 MC33078
I013 HCF4081B
I014 SSM2404S
I015 74LVQ125
I016 74LVC14APW
I018 NJM2234
W321
W301
18.432MHz
AOUTSUB
AOUTC
AOUTRS
AOUTLS
AOUTR
AOUTL
LRCK
SCLK
I2SCLK
I2SWS
I2SDI
SCL1
SDA1
RESET
INTREQ
EXTMEM
RD
CLK
SPDIFIN
SPDIFIN2
SPDIFIN3
SPDIFOUT
MUTE
LFE/SUB
RS
LS
R
L
LC
RC
C
U5
U3.3
U12
U-12
14.9.01 Ex

Benennung: LOEWE.

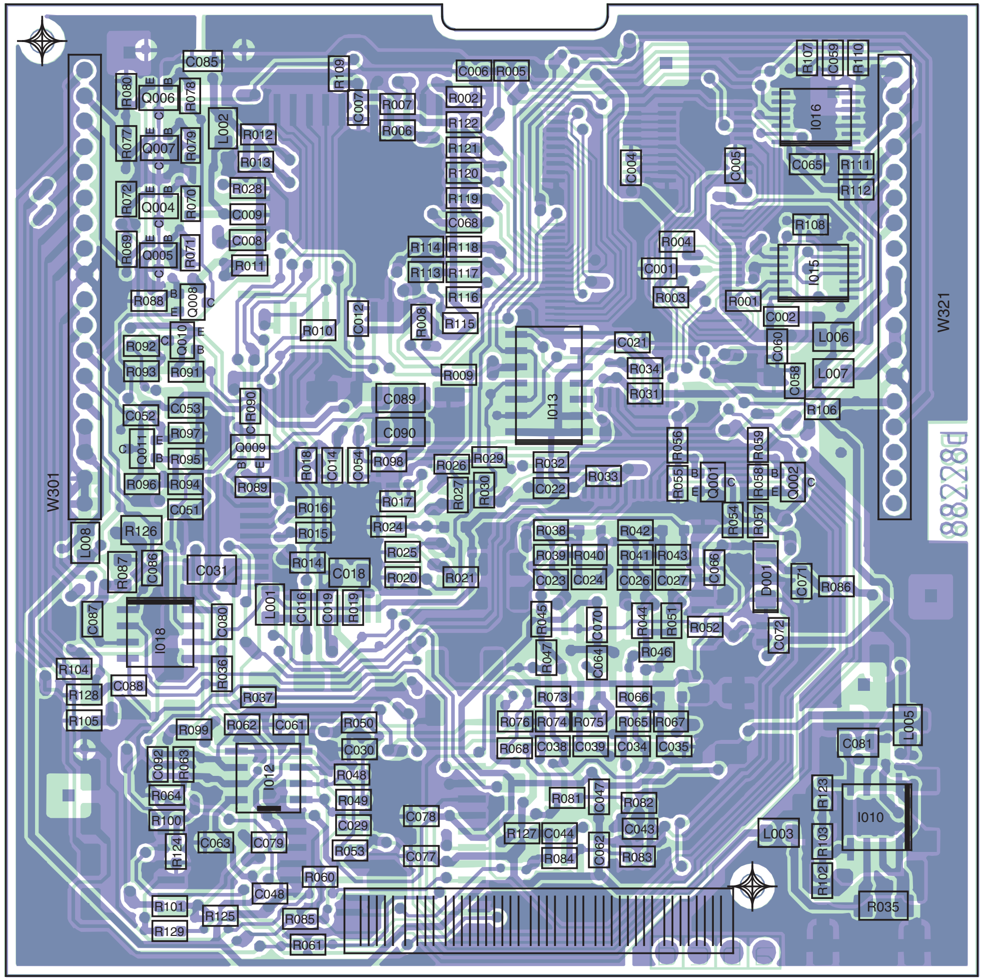
AC3-Modul

Dolby Digital

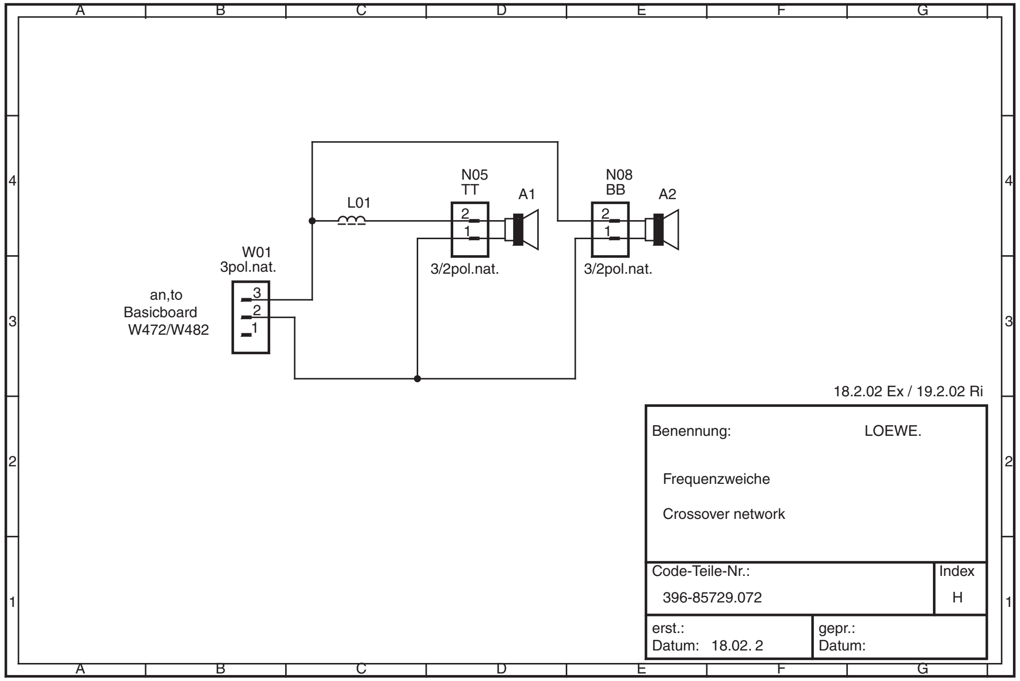
Code-Teile-Nr.: 396-88228		Index:
Variante: alle Varianten		c
erst.: Kestel Datum:14.09.2001	gepr.: Datum:	


I003
I004
I001
C069
C010
I005
C011
C003
C015
C013
C050
I011
C049
I002
C084
88228d
C028
C025
I009
C076
C056
I007
C075
C067
C037
C041
C020
C017
C057
C032
C036
C040
C046
D002
L004
C042
I008
I014
I006
C033
C091
C073
C045
a
b
c
d

Lpl. AC3 88228D Bestückungsseite
AC3 P.C.B 88228D Components side


C085
R080
Q006
R078
R077
Q007
R079
R072
Q004
R070
R069
Q005
R071
R088
Q008
R092
Q010
R093
R091
C052
C053
Q011
R097
R095
R096
R094
C051
W301
L008
R126
R087
C036
C031
C087
I018
C080
R104
C088
R036
R128
R105
R037
R099
R062
C061
C092
R063
I012
R064
R100
R124
C063
C079
R101
R129
R125
C048
R085
R061
L002
R012
R013
R028
C009
C008
R011
R090
Q009
R089
R109
C007
R007
R006
C006
R005
R002
R122
R121
R120
R119
C068
R114
R118
R113
R117
R116
R008
R115
R010
C012
R009
C089
C090
R018
C014
C054
R098
R026
R029
R027
R030
R017
R016
R024
R015
R025
R014
C018
R020
R021
L001
C016
C019
R019
R050
C030
R048
R049
C029
R053
R060
C078
C077
C004
C005
C001
R004
R003
C021
R034
R031
I013
R032
C022
R033
R038
R039
R040
C023
C024
R042
R041
R043
C026
C027
R045
R047
C070
C064
R044
R046
R051
R052
R073
R076
R074
R075
R068
C038
C039
R066
R065
R067
C034
C035
R081
C047
R082
C043
R127
C044
R084
C062
R083
R107
C059
R110
I016
C065
R111
R112
R108
I015
R001
C002
L006
C060
C058
L007
R106
W321
R056
R055
Q001
R054
R059
R058
Q002
R057
C066
D001
C071
R086
C072
L005
C081
R123
I010
R103
R102
L003
R035
88228d

Lpl. AC3 88228D Lötseite
AC3 P.C.B 88228D Solder side


A
B
C
D
E
F
G
4
3
2
1
L01
N05
TT
A1
N08
BB
A2
2
1
W01
3pol.nat.
3/2pol.nat.
3/2pol.nat.
an,to
Basicboard
W472/W482
3
2
1

18.2.02 Ex / 19.2.02 Ri

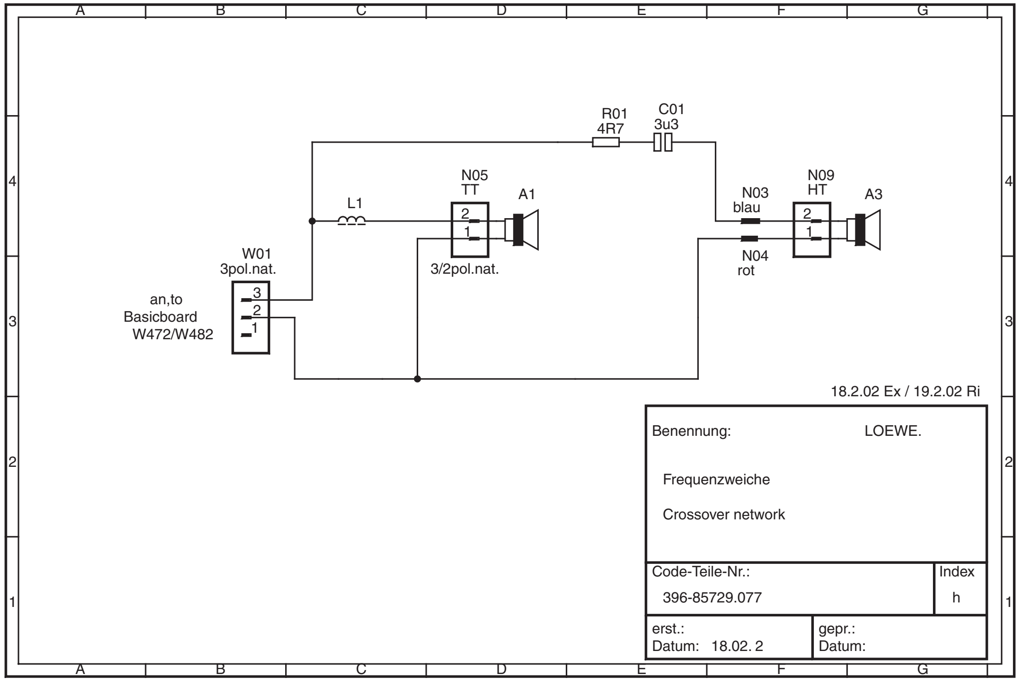
Benennung: LOEWE.

Frequenzweiche

Crossover network

Code-Teile-Nr.:	Index
396-85729.072	H

erst.:	gepr.:
Datum: 18.02. 2	Datum:


A
B
C
D
E
F
G
4
3
2
1
R01
4R7
C01
3u3
L1
N05
TT
A1
N03
blau
N09
HT
A3
N04
rot
2
1
W01
3pol.nat.
3/2pol.nat.
an,to
Basicboard
W472/W482
3
2
1

18.2.02 Ex / 19.2.02 Ri

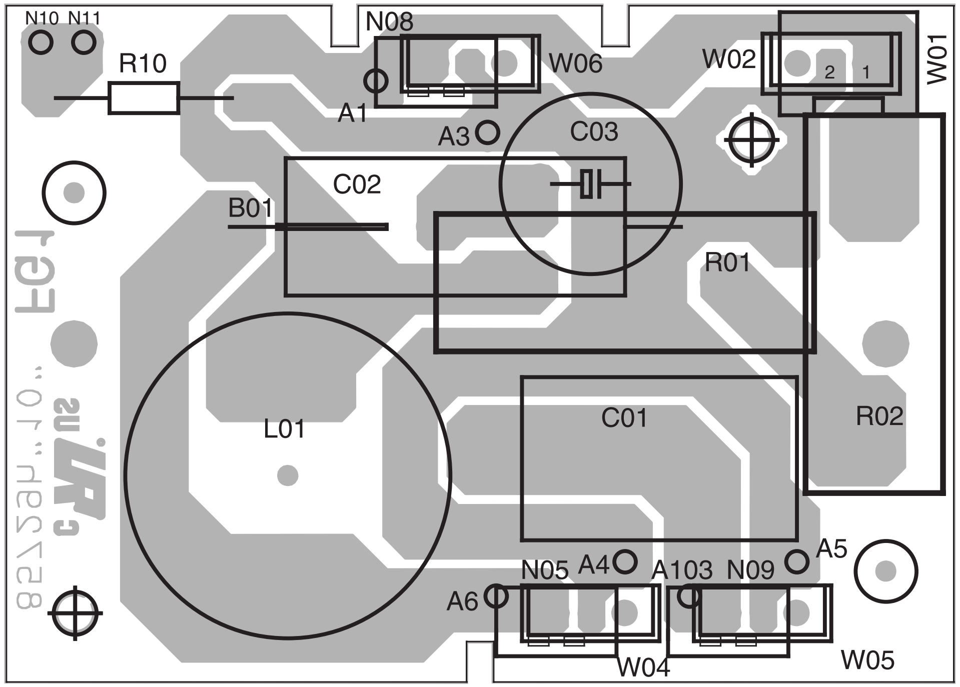
Benennung: LOEWE.

Frequenzweiche

Crossover network

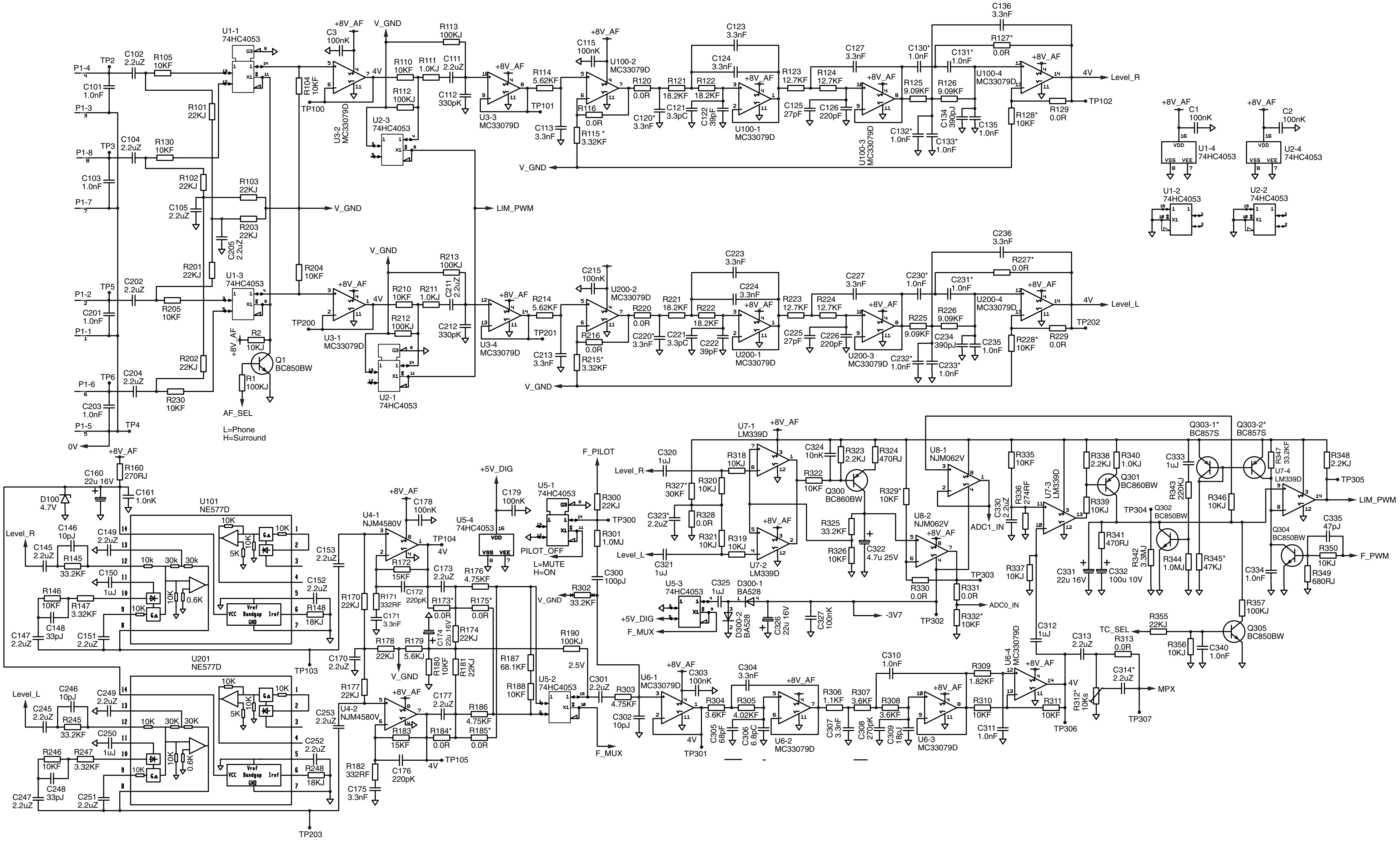
Code-Teile-Nr.:	Index
396-85729.077	h

erst.:	gepr.:
Datum: 18.02. 2	Datum:


N10 N11
R10
N08
W06
W02
2 1
W01
A1
A3
C03
C02
B01
R01
L01
C01
R02
N05
A4
A103
N09
A5
A6
W04
W05

Ltpl. Frequenzweiche 85729H
Bestückungsseite

Cross-over network P.C.B 85729H
Components side


U1-1 74HC4053
U1-3 74HC4053
U2-1 74HC4053
U2-3 74HC4053
U1-4 74HC4053
U2-4 74HC4053
U1-2 74HC4053
U2-2 74HC4053
U3-1 MC33079D
U3-2 MC33079D
U3-3 MC33079D
U3-4 MC33079D
U100-1 MC33079D
U100-2 MC33079D
U100-3 MC33079D
U100-4 MC33079D
U200-1 MC33079D
U200-2 MC33079D
U200-3 MC33079D
U200-4 MC33079D
P1-4
P1-3
P1-8
P1-7
P1-2
P1-1
P1-6
P1-5
0V
TP2
TP3
TP4
TP5
TP6
TP100
TP101
TP102
TP200
TP201
TP202
+8V_AF
V_GND
LIM_PWM
Level_R
Level_L
4V
Q1 BC850BW
AF_SEL
L=Phone
H=Surround
U101 NE577D
U201 NE577D
D100 4.7V
U4-1 NJM4580V
U4-2 NJM4580V
U5-1 74HC4053
U5-2 74HC4053
U5-3 74HC4053
U5-4 74HC4053
+5V_DIG
F_PILOT
PILOT_OFF
L=MUTE
H=ON
F_MUX
+5V_DIG
TP103
TP104
TP105
TP203
TP300
TP301
TP302
TP303
TP304
TP305
TP306
TP307
U6-1 MC33079D
U6-2 MC33079D
U6-3 MC33079D
U6-4 MC33079D
U7-1 LM339D
U7-2 LM339D
U7-3 LM339D
U7-4 LM339D
U8-1 NJM062V
U8-2 NJM062V
Q300 BC860BW
Q301 BC860BW
Q302 BC850BW
Q303-1* BC857S
Q303-2* BC857S
Q304 BC850BW
Q305 BC850BW
D300-1 BA528
D300-2 BA528
ADC1_IN
ADC0_IN
-3V7
TC_SEL
F_PWM
MPX
Vref
Bandgap
Iref
VCC
GND

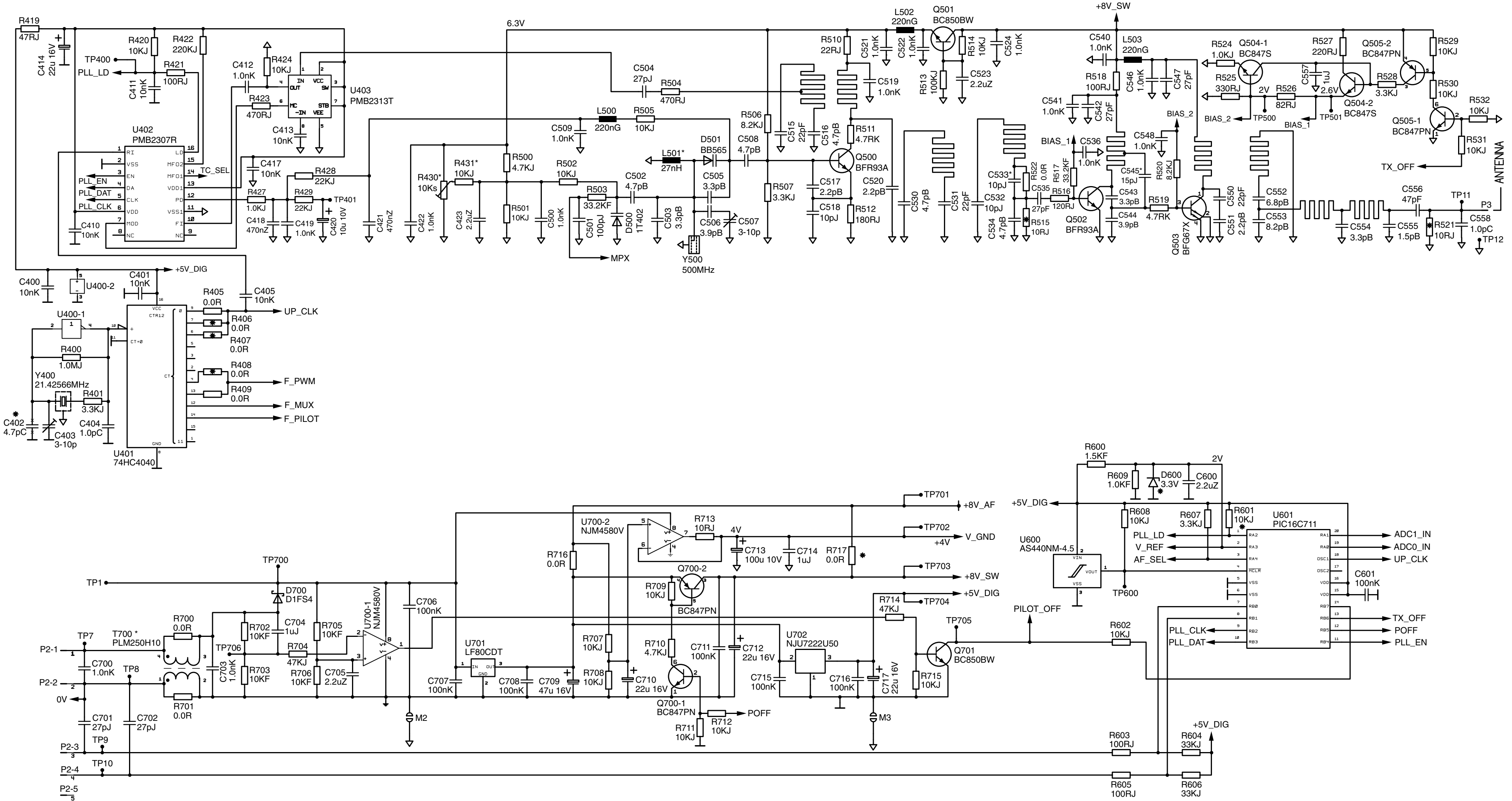
* never mounted: C120, C130, C131, C132, C133, C220, C230, C231, C232, C233, C314, C323;

R173, R175, R184, R185, R115, R127, R128, R215, R227, R228, R312, R327, R328, R332, R345;

Q303;

Schaltplan 1 HF-Sender 88066.001

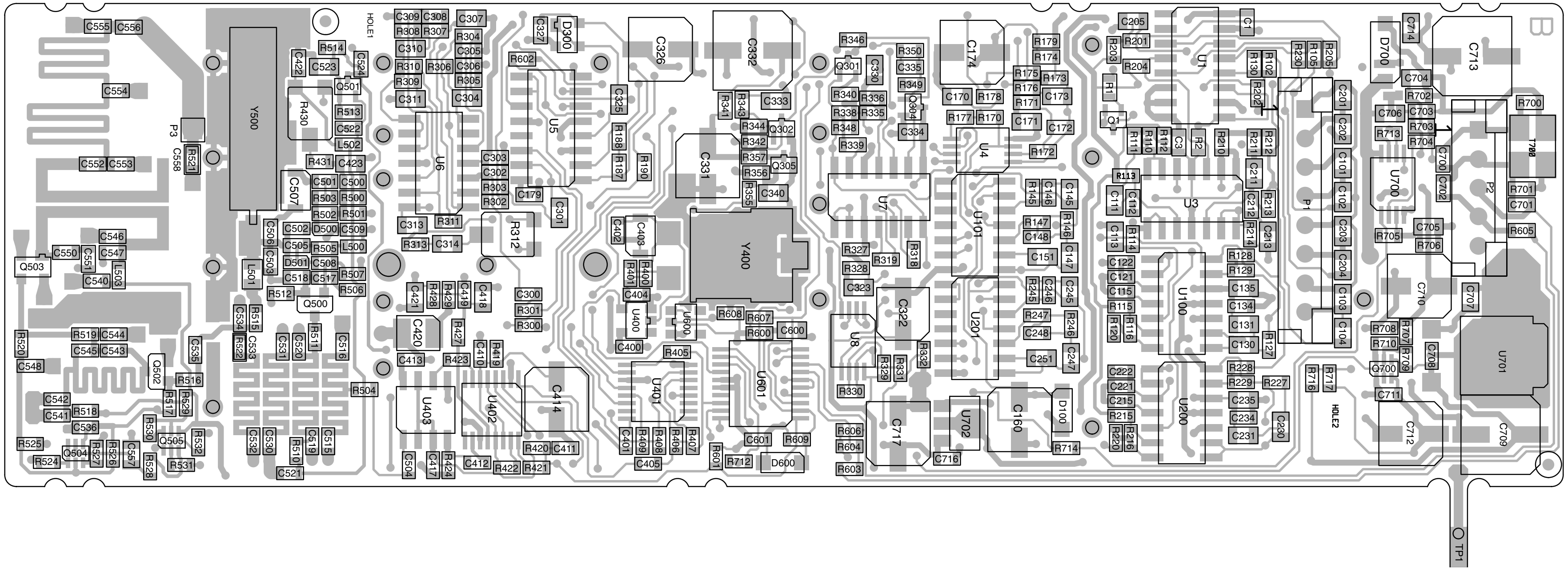
RF Transmitter schematic (1) 88066.001


R419
47RJ
C414
22u 16V
R420
10KJ
R422
220KJ
TP400
PLL_LD
R421
100RJ
C411
10nK
C412
1.0nK
R424
10KJ
U403
PMB2313T
R423
470RJ
C413
10nK
U402
PMB2307R
RI
VSS
EN
DA
CLK
VDD
MDD
NC
LD
MFO2
MFO1
VDD1
PD
VSS1
FI
NC
TC_SEL
PLL_EN
PLL_DAT
PLL_CLK
C410
10nK
C417
10nK
R428
22KJ
R427
1.0KJ
R429
22KJ
TP401
C418
470nZ
C419
1.0nK
C420
10u 10V
C421
470nZ
6.3V
C504
27pJ
R504
470RJ
L500
220nG
R505
10KJ
C509
1.0nK
R430*
10Ks
R431*
10KJ
C422
1.0nK
C423
2.2uZ
R500
4.7KJ
R501
10KJ
R502
10KJ
R503
33.2KF
C500
1.0nK
C501
100pJ
D500
1T402
C502
4.7pB
C503
3.3pB
MPX
L501*
27nH
D501
BB565
C505
3.3pB
C506
3.9pB
C507
3-10p
Y500
500MHz
C508
4.7pB
R506
8.2KJ
R507
3.3KJ
C515
22pF
C516
4.7pB
R510
22RJ
C521
1.0nK
L502
220nG
C522
1.0nK
Q501
BC850BW
R514
10KJ
C524
1.0nK
R513
100KJ
C523
2.2uZ
C519
1.0nK
R511
4.7RK
Q500
BFR93A
C517
2.2pB
C518
10pJ
C520
2.2pB
R512
180RJ
C530
4.7pB
C531
22pF
C532
10pJ
C534
4.7pB
C533*
10pJ
R522
0.0R
R517
33.2KF
C535
27pF
R515
10RJ
R516
120RJ
Q502
BFR93A
+8V_SW
C540
1.0nK
L503
220nG
R518
100RJ
C546
1.0nK
C547
27pF
C541
1.0nK
C542
27pF
BIAS_1
C536
1.0nK
C548
1.0nK
BIAS_2
C545*
15pJ
C543
3.3pB
C544
3.9pB
R520
8.2KJ
R519
4.7RK
Q503
BFG67X
C550
22pF
C551
2.2pB
C552
6.8pB
C553
8.2pB
R524
1.0KJ
Q504-1
BC847S
R525
330RJ
2V
R526
82RJ
C557
1uJ
2.6V
TP500
TP501
Q504-2
BC847S
R527
220RJ
Q505-2
BC847PN
R528
3.3KJ
R529
10KJ
R530
10KJ
R532
10KJ
Q505-1
BC847PN
R531
10KJ
TX_OFF
ANTENNA
C556
47pF
TP11
P3
C554
3.3pB
C555
1.5pB
R521
10RJ
C558
1.0pC
TP12
C400
10nK
U400-2
C401
10nK
+5V_DIG
C405
10nK
R405
0.0R
UP_CLK
R406
0.0R
R407
0.0R
U400-1
R400
1.0MJ
Y400
21.42566MHz
R401
3.3KJ
C402
4.7pC
C403
3-10p
C404
1.0pC
R408
0.0R
R409
0.0R
F_PWM
F_MUX
F_PILOT
U401
74HC4040
VCC
CTR12
CT=0
CT
GND
R600
1.5KF
2V
R609
1.0KF
D600
3.3V
C600
2.2uZ
+5V_DIG
R608
10KJ
R607
3.3KJ
R601
10KJ
U601
PIC16C711
PLL_LD
V_REF
AF_SEL
ADC1_IN
ADC0_IN
UP_CLK
U600
AS440NM-4.5
VIN
VOUT
VSS
TP600
C601
100nK
PILOT_OFF
R602
10KJ
PLL_CLK
PLL_DAT
TX_OFF
POFF
PLL_EN
TP701
+8V_AF
TP702
V_GND
+4V
TP703
+8V_SW
+5V_DIG
TP704
U700-2
NJM4580V
R713
10RJ
4V
C713
100u 10V
C714
1uJ
R717
0.0R
R716
0.0R
Q700-2
BC847PN
R709
10KJ
TP700
TP1
D700
D1FS4
C704
1uJ
R705
10KF
U700-1
NJM4580V
C706
100nK
R714
47KJ
TP705
Q701
BC850BW
R715
10KJ
T700 *
PLM250H10
R700
0.0R
R701
0.0R
TP7
P2-1
P2-2
C700
1.0nK
TP8
0V
C701
27pJ
C702
27pJ
TP706
C703
1.0nK
R702
10KF
R703
10KF
R704
47KJ
R706
10KF
C705
2.2uZ
U701
LF80CDT
IN
OUT
GND
C707
100nK
C708
100nK
C709
47u 16V
R707
10KJ
R708
10KJ
C710
22u 16V
R710
4.7KJ
C711
100nK
C712
22u 16V
Q700-1
BC847PN
R711
10KJ
R712
10KJ
POFF
U702
NJU7222U50
C715
100nK
C716
100nK
C717
22u 16V
M2
M3
TP9
P2-3
TP10
P2-4
P2-5
R603
100RJ
R604
33KJ
+5V_DIG
R605
100RJ
R606
33KJ

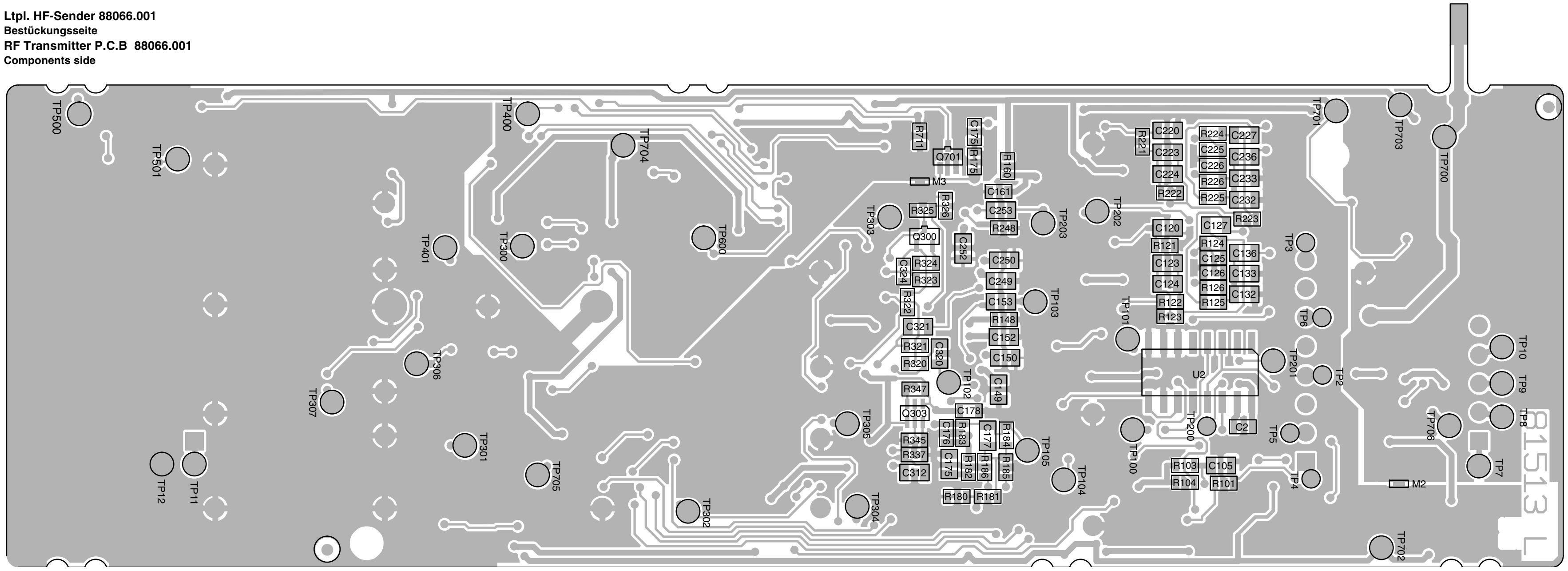
* never mounted: C402, C403, C533, C545;
L501;
R 406, R407, R408, R430, R431, R515, R521, R601, R717;
T700;
D 600

Schaltplan 2 HF-Sender 88066.001

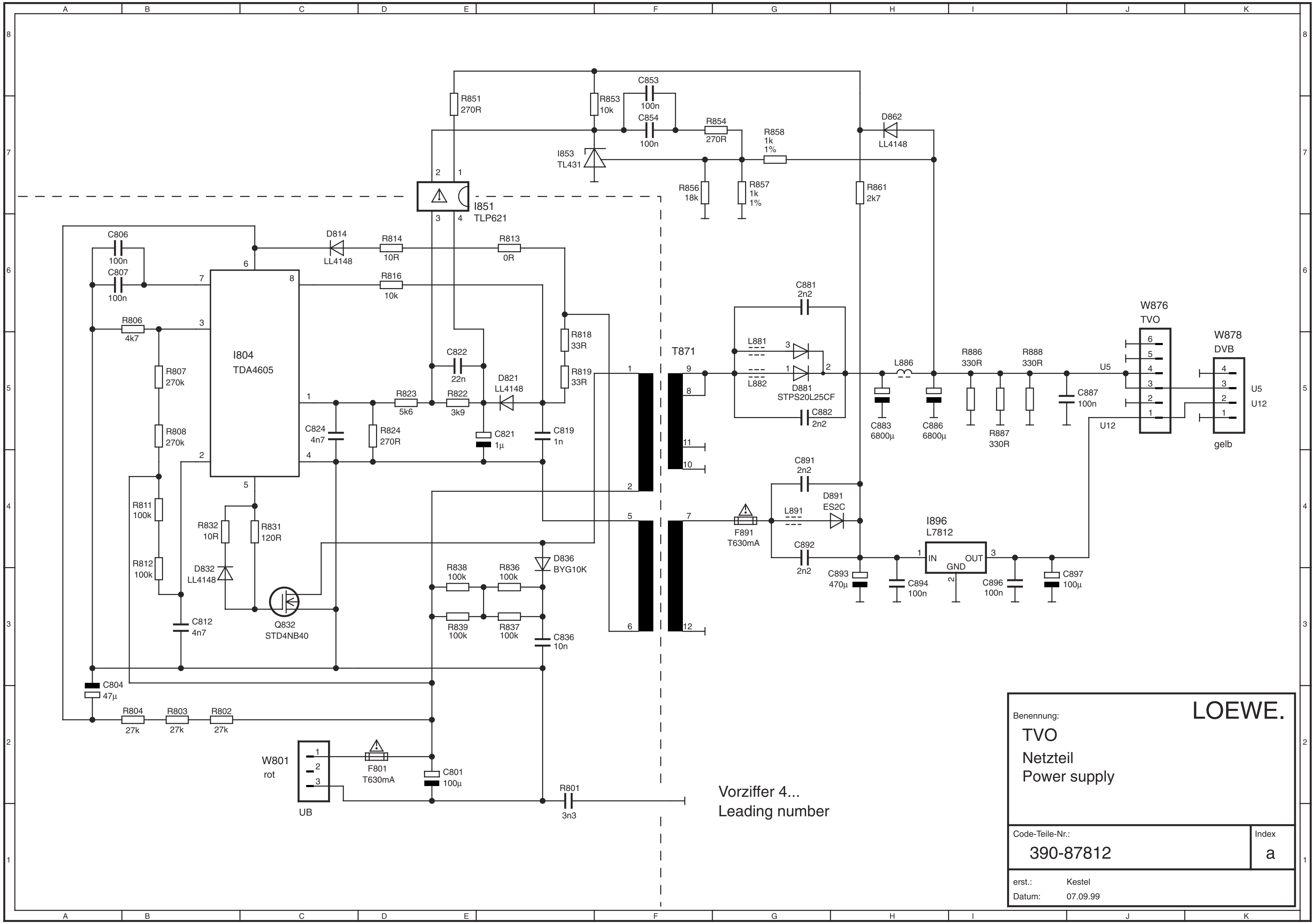
RF Transmitter schematic (2) 88066.001


B
Y500
Y400
U1
U3
U4
U5
U6
U7
U8
U100
U101
U200
U201
U400
U401
U402
U403
U600
U601
U700
U701
U702
P1
P2
P3
HOLE1
HOLE2
TP1
C326
C332
C331
C174
C713
C717
C160
C414
C420
C507
D300
D700
D100
D600
Q1
Q301
Q302
Q304
Q305
Q500
Q501
Q502
Q503
Q504
Q505
Q700
R312
R430
T700

Ltpl. HF-Sender 88066.001
Bestückungsseite
RF Transmitter P.C.B 88066.001
Components side

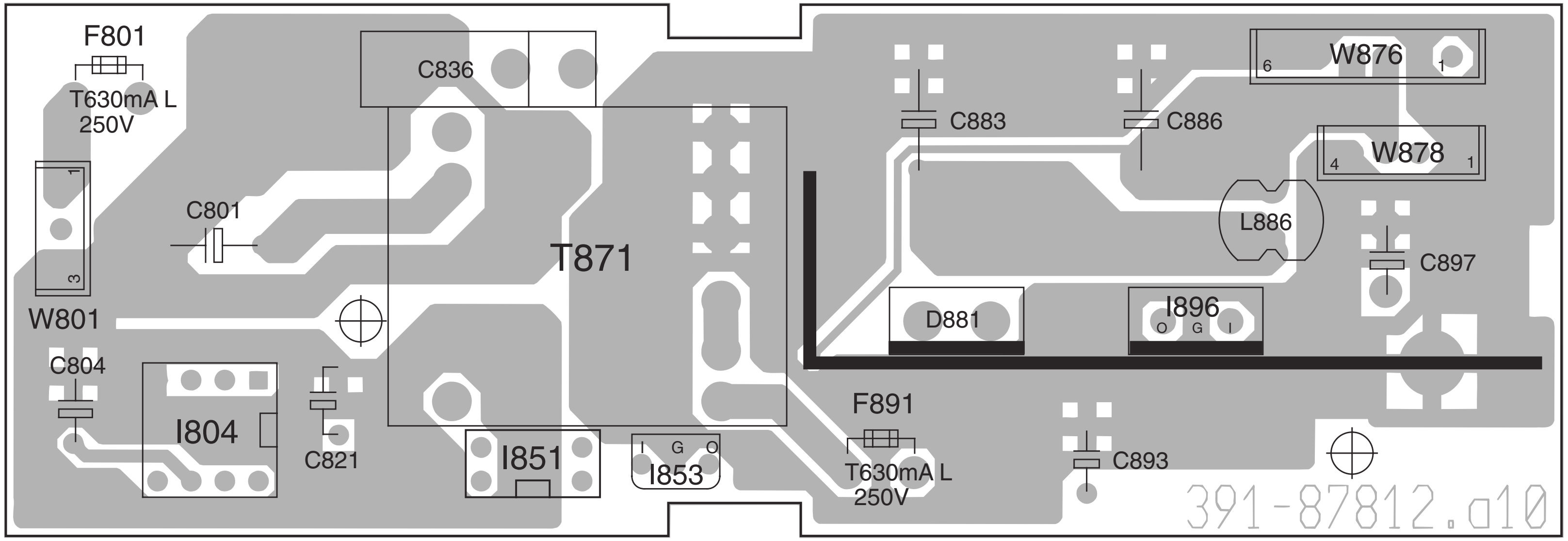

B1513 L
TP500
TP501
TP400
TP704
TP401
TP300
TP600
TP303
TP306
TP307
TP301
TP705
TP302
TP304
TP305
TP12
TP11
TP102
TP103
TP105
TP104
TP203
TP202
TP101
TP100
TP200
TP201
TP701
TP703
TP700
TP706
TP702
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
U2
Q300
Q303
Q701
M2
M3

Ltpl. HF-Sender 88066.001
Lötseite
RF Transmitter P.C.B 88066.001
Solder side

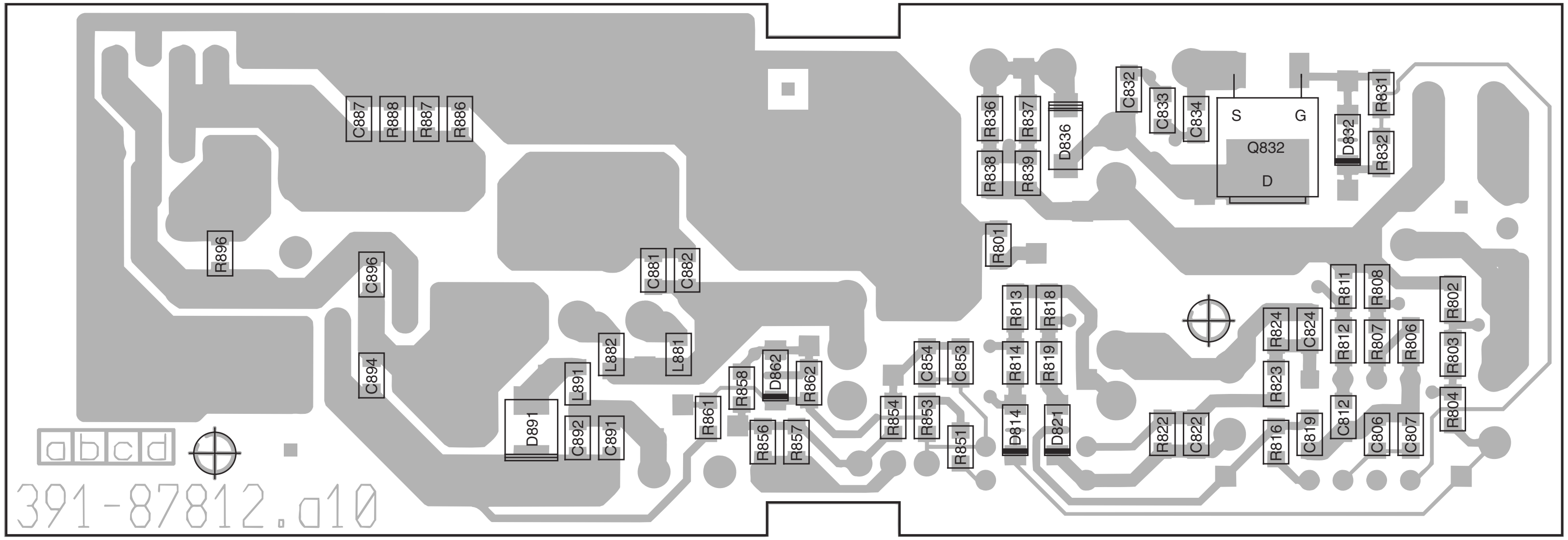

A
B
C
D
E
F
G
H
I
J
K
1
2
3
4
5
6
7
8
R851
270R
R853
10k
C853
100n
C854
100n
R854
270R
R858
1k
1%
D862
LL4148
I853
TL431
R856
18k
R857
1k
1%
R861
2k7
I851
TLP621
C806
100n
C807
100n
D814
LL4148
R814
10R
R813
0R
R816
10k
R806
4k7
I804
TDA4605
R807
270k
R808
270k
C822
22n
D821
LL4148
R818
33R
R819
33R
R823
5k6
R822
3k9
C824
4n7
R824
270R
C821
1µ
C819
1n
T871
C881
2n2
L881
L882
D881
STPS20L25CF
C882
2n2
L886
R886
330R
R888
330R
R887
330R
C883
6800µ
C886
6800µ
C887
100n
W876
TVO
W878
DVB
U5
U12
gelb
R811
100k
R812
100k
R832
10R
R831
120R
D832
LL4148
Q832
STD4NB40
C812
4n7
D836
BYG10K
R838
100k
R836
100k
R839
100k
R837
100k
C836
10n
C891
2n2
D891
ES2C
L891
F891
T630mA
C892
2n2
I896
L7812
IN
OUT
GND
C893
470µ
C894
100n
C896
100n
C897
100µ
C804
47µ
R804
27k
R803
27k
R802
27k
W801
rot
UB
F801
T630mA
C801
100µ
R801
3n3
Vorziffer 4...
Leading number
Benennung:
LOEWE.
TVO
Netzteil
Power supply
Code-Teile-Nr.:
Index
390-87812
a
erst.:
Kestel
Datum:
07.09.99

Schaltbild Netzteil 390-87812

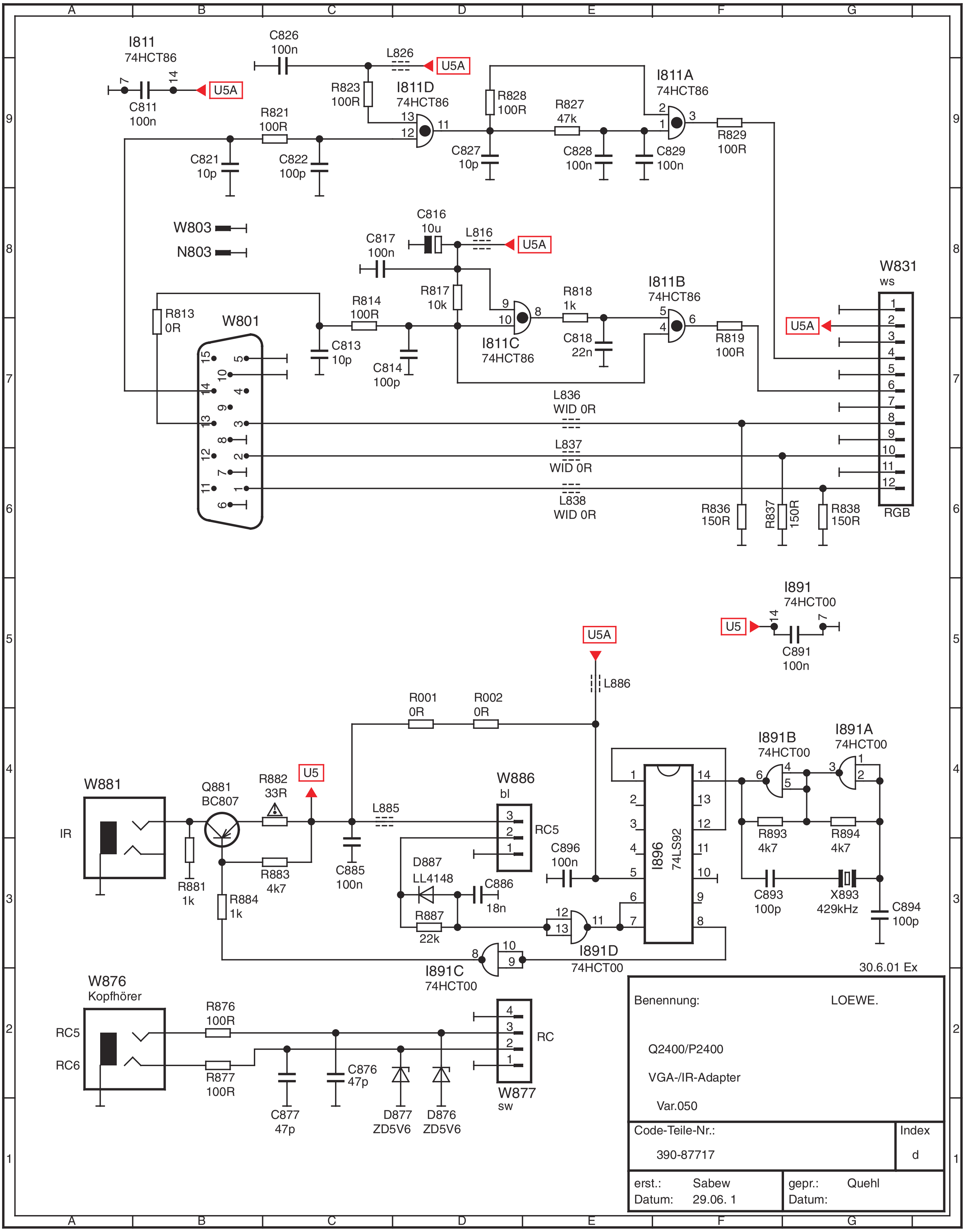
Power supply schematic diagram 396-87812


F801
T630mA L
250V
C836
W876
6
1
C883
C886
W878
4
1
1
3
W801
C801
T871
L886
C897
D881
I896
O G I
C804
I804
C821
I851
I853
I G O
F891
T630mA L
250V
C893
391-87812.a10

Leiterplatte Netzteil 390-87812
Bestückungsseite
Power supply PCB 390-87812
Components side

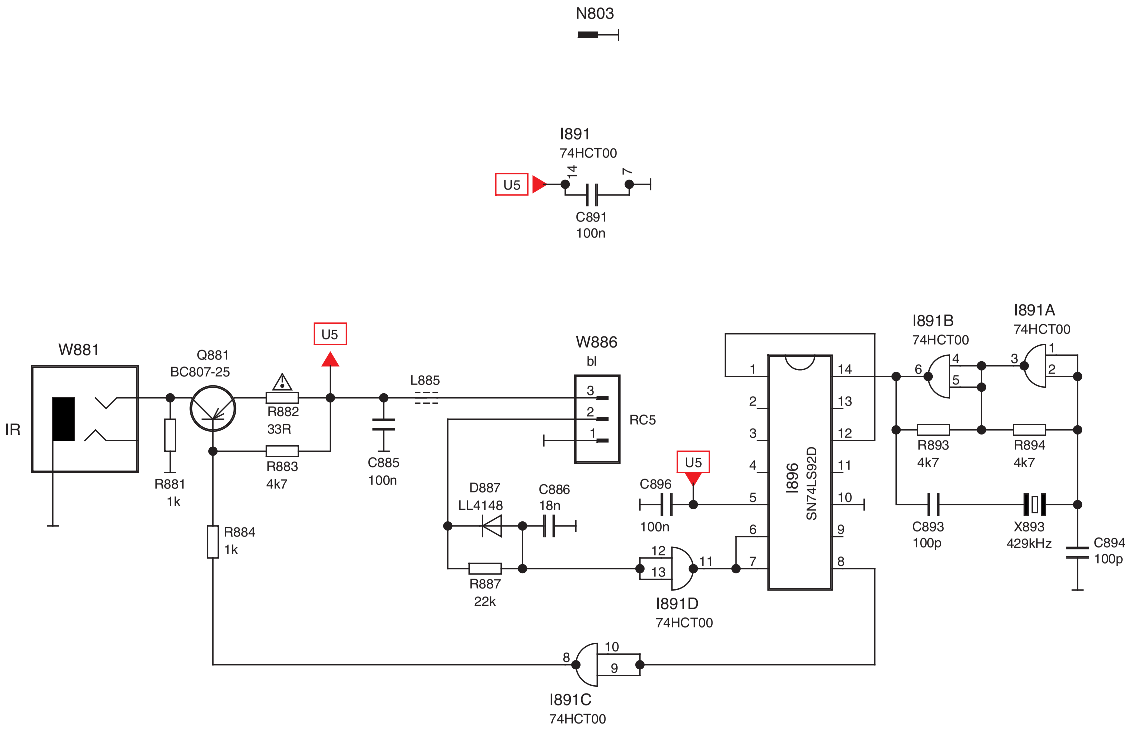

C887
R888
R887
R886
R836
R837
D836
C832
C833
C834
S
G
Q832
D
D832
R831
R832
R838
R839
R801
R896
C896
C881
C882
R813
R818
R811
R808
R802
R824
C824
R812
R807
R806
R803
L882
L881
C854
C853
R814
R819
C894
L891
D862
R858
R862
R823
R804
D891
C892
C891
R861
R856
R857
R854
R853
R851
D814
D821
R822
C822
R816
C819
C812
C806
C807
abcd
391-87812.a10

Leiterplatte Netzteil 390-87812
Lötseite
Power supply PCB 390-87812
Solder side


I811
74HCT86
C811
100n
C826
100n
L826
U5A
R823
100R
I811D
74HCT86
R828
100R
R827
47k
I811A
74HCT86
R829
100R
R821
100R
C821
10p
C822
100p
C827
10p
C828
100n
C829
100n
W803
N803
C816
10u
C817
100n
L816
R817
10k
R818
1k
I811B
74HCT86
I811C
74HCT86
C818
22n
R819
100R
R814
100R
R813
0R
W801
C813
10p
C814
100p
W831
ws
RGB
L836
WID 0R
L837
WID 0R
L838
WID 0R
R836
150R
R837
150R
R838
150R
I891
74HCT00
U5
C891
100n
L886
R001
0R
R002
0R
I891B
74HCT00
I891A
74HCT00
W881
IR
Q881
BC807
R882
33R
R881
1k
R883
4k7
R884
1k
L885
C885
100n
W886
bl
RC5
C896
100n
D887
LL4148
C886
18n
R887
22k
I896
74LS92
R893
4k7
R894
4k7
C893
100p
X893
429kHz
C894
100p
I891C
74HCT00
I891D
74HCT00
30.6.01 Ex
W876
Kopfhörer
RC5
RC6
R876
100R
R877
100R
C877
47p
C876
47p
D877
ZD5V6
D876
ZD5V6
W877
sw
RC
Benennung:
LOEWE.
Q2400/P2400
VGA-/IR-Adapter
Var.050
Code-Teile-Nr.:
390-87717
Index
d
erst.: Sabew
Datum: 29.06. 1
gepr.: Quehl
Datum:
A B C D E F G
1 2 3 4 5 6 7 8 9

Schaltbild VGA/IR Adapter 87717.050

VGA/IR Adapter schematic 87717.050


N803
I891
74HCT00
14
7
U5
C891
100n
W881
IR
Q881
BC807-25
R881
1k
R882
33R
R883
4k7
R884
1k
U5
C885
100n
L885
W886
bl
3
2
1
RC5
D887
LL4148
C886
18n
R887
22k
C896
100n
U5
I896
SN74LS92D
1
2
3
4
5
6
7
8
9
10
11
12
13
14
I891D
74HCT00
12
13
11
I891C
74HCT00
8
10
9
I891B
74HCT00
6
4
5
I891A
74HCT00
3
1
2
R893
4k7
R894
4k7
C893
100p
X893
429kHz
C894
100p

5.3.02 Ex/11.3.02 Ri

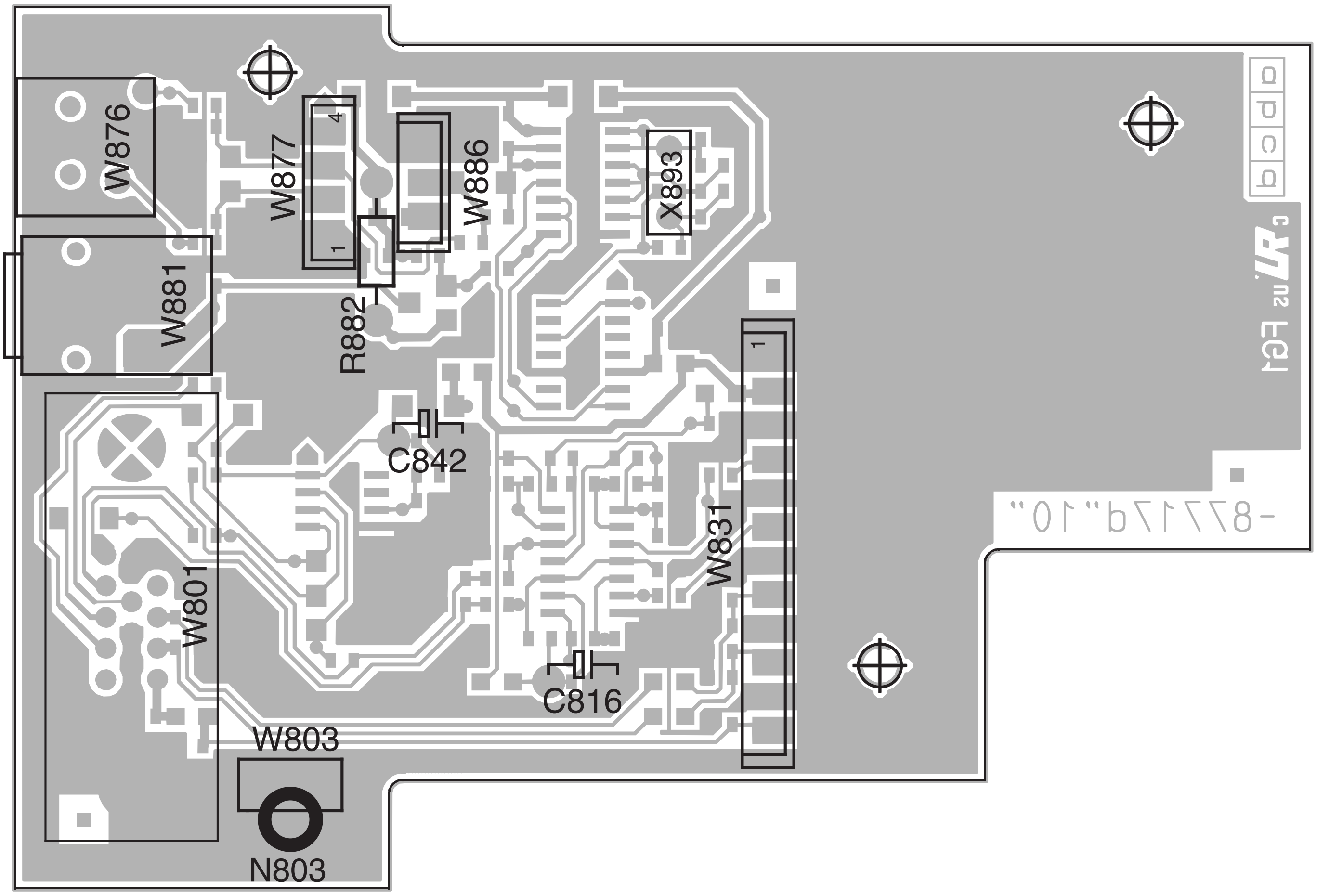
Benennung: LOEWE.

Q2400

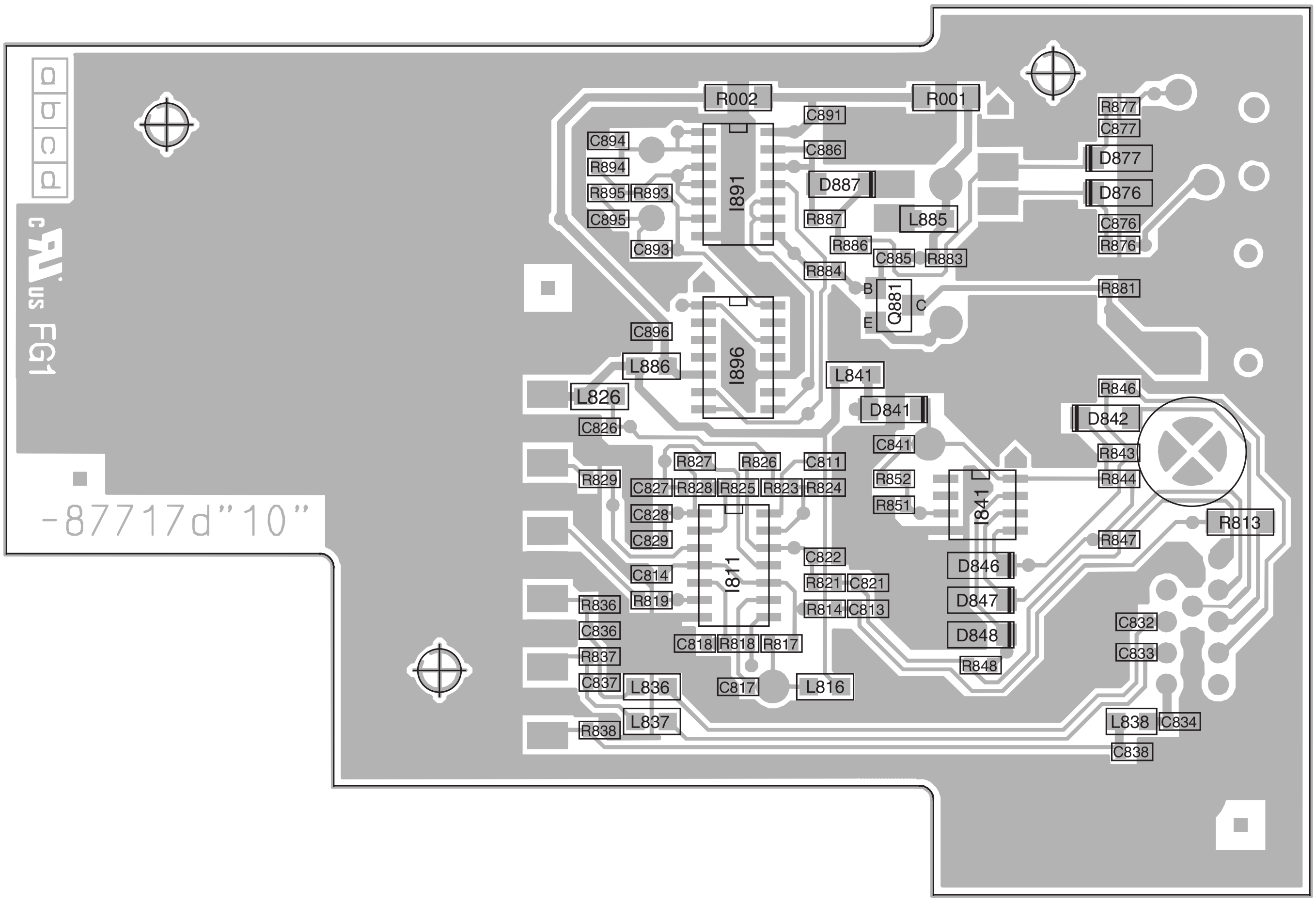
VGA-/IR-Adapter

Code-Teile-Nr.:	Index
390-87717.070	D

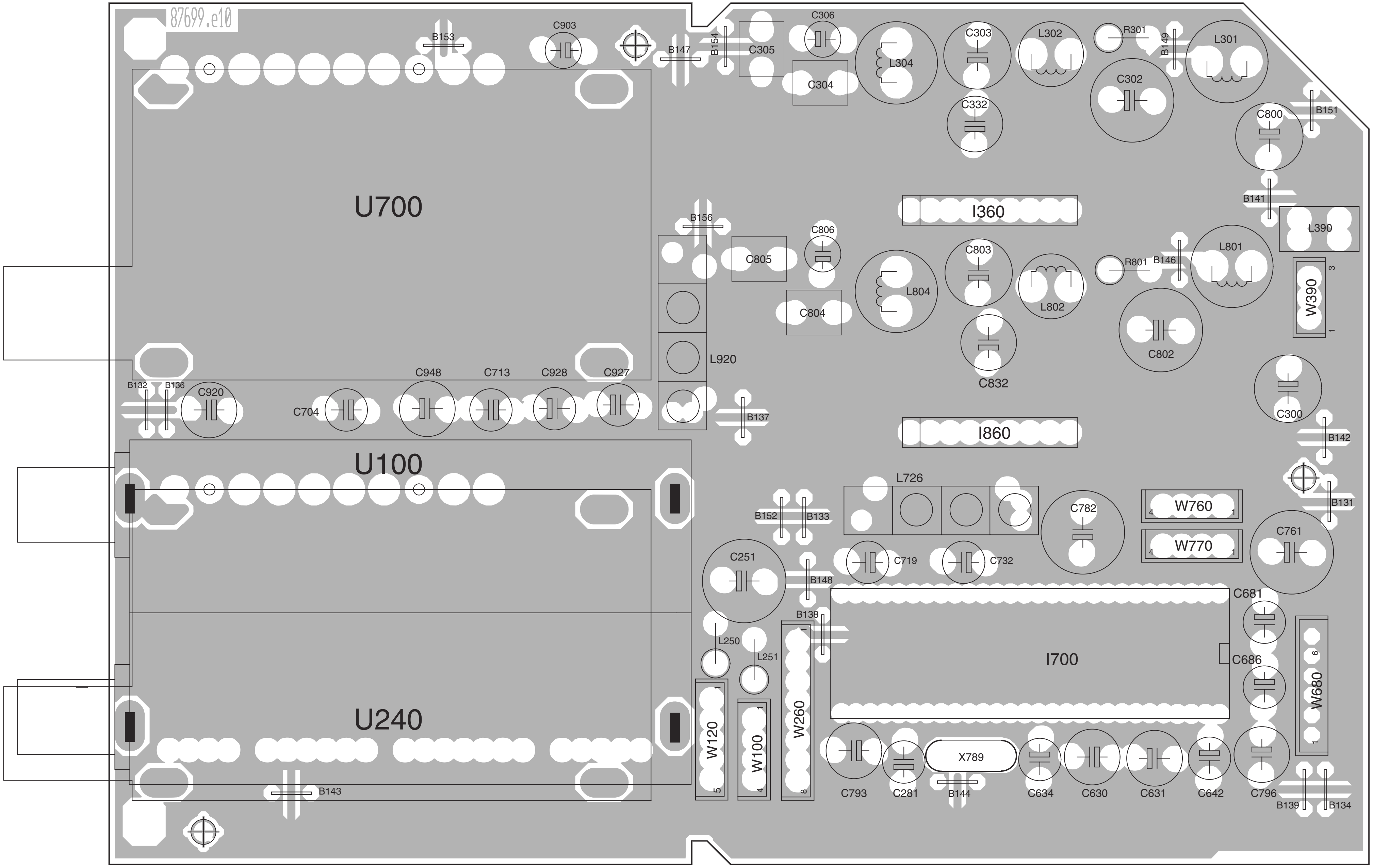
erst.: Sabew	gepr.: Quehl
Datum: 8.2.01	Datum:


W876
W877
4
1
W886
X893
W881
R882
C842
W831
1
W801
C816
W803
N803
FG1
a
b
c
d
-87717d"10"

Ltpl. **VGA/IR-Adapter 87717D** Bestückungsseite • **VGA/IR Adaptor 87717D** Components side

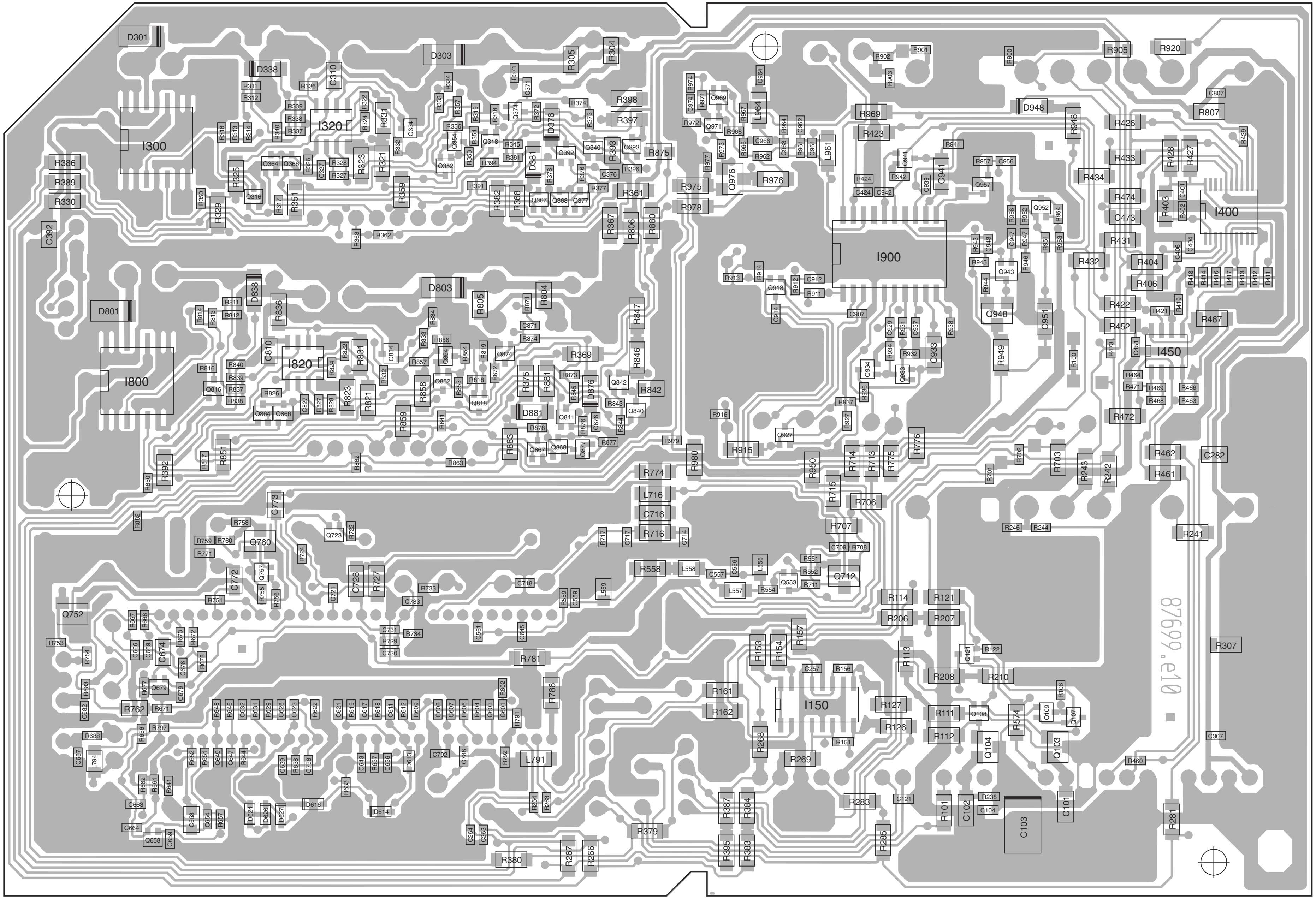

a
b
c
d
FG1
-87717d"10"
R002
R001
C891
C886
C894
R894
R895
R893
C895
C893
I891
D887
R887
L885
R886
C885
R883
R884
Q881
B
C
E
R877
C877
D877
D876
C876
R876
R881
C896
L886
I896
L841
L826
C826
D841
R846
D842
C841
R843
R844
R827
R826
C811
R829
C827
R828
R825
R823
R824
R852
R851
I841
R813
C828
C829
R847
C822
C814
I811
R821
C821
D846
R836
R819
R814
C813
D847
C836
C818
R818
R817
D848
C832
R837
R848
C833
C837
L836
C817
L816
R838
L837
L838
C834
C838

Ltpl. **VGA/IR-Adapter 87717D** Lötseite • **VGA/IR Adaptor 87717D** Solder side


87699.e10
B153
C903
B147
B154
C305
C306
C304
C303
L304
C332
L302
R301
B149
L301
C302
C800
B151
U700
I360
B141
B156
C806
C805
C803
L804
C804
R801
B146
L801
L390
W390
3
1
L802
C802
C832
L920
B132
B136
C920
C704
C948
C713
C928
C927
B137
C300
I860
B142
U100
L726
B131
B152
B133
C782
W760
4
1
C761
W770
4
1
C251
C719
C732
B148
C681
B138
L250
L251
I700
C686
W680
6
1
W260
8
W120
1
5
W100
1
4
U240
B143
C793
C281
X789
B144
C634
C630
C631
C642
C796
B139
B134

Leiterplatte SAT VI 392-87699D
Bestückungsseite

SAT VI P.C.B. 392-87699D
Components Side


D301
D303
D338
I300
I320
R305
R304
R398
R397
R875
R386
R389
R330
C392
R359
R361
R367
R806
R880
R975
R978
Q976
R976
L964
L961
R969
R423
D948
R948
R905
R920
R807
R426
R433
R434
R428
R427
R474
C473
R403
I400
R431
R432
R404
R406
I900
Q941
Q948
Q951
R949
Q933
R422
R452
R467
I450
R472
R462
R461
C282
D801
I800
D803
D838
I820
R836
R804
R805
R847
R846
R842
R369
R375
R881
D876
D881
R859
R858
R883
R851
R392
R823
R821
R774
L716
C716
R716
R980
R915
R990
R714
R713
R775
R776
R715
R706
R707
R703
R243
R242
R241
C773
Q760
C772
C728
R727
Q752
C674
R762
R781
R786
R558
Q712
R114
R121
R206
R207
R113
R153
R154
R157
R208
R210
R161
R162
I150
R127
R126
R111
R112
R574
Q104
Q103
R268
R269
R283
R101
C102
C101
C103
R281
R307
R387
R384
R395
R383
R285
R379
R380
R267
R266
L791
87699.e10

Leiterplatte SAT VI 392-87699D
Lötseite

SAT VI P.C.B. 392-87699D
Solder Side

Baugruppenübersicht / Components charts

Q 2500 H	Software	H 951	H 650	H 952	H 951	H 051	H 951	H 951	H 454	H 855	
	Farbe	B/I/G	H/L	H/L	H/L	H/L	R	A/M	A/L	A/L	
	Art.-Nr	61401.62	61402.62	61405.52	61405.62	61406.63	61404.63	61450.62	61466.62	61465.62	
Baugruppen	Geräte-Typ	Aconda 9281 ZW	Aconda 9372 ZP	Aconda 9381 ZW	Aconda 9381 ZW	Aconda 93102 ZW	Aconda 9581 ZW	Articos 32	Xelos 5970 TV-M	Xelos 5981 TV-M	
Basic-Board	396-88175...	056	050	055	055	052	055	055	053	054	Baugruppen
Hyperband-Tuner/ZF, Multisystem	260-87271.051	x	x	x	x	x	x	x	x	x	
Hyperband-Tuner/ZF, EPAS	260-87998.050	x	x	x	x	x	x	x	x	x	
Signal-Board	396-88176...	053	053*	053*	053*	054*	054*	053	053	053	
Bedienteil	396-88225...								053	053	
Bedienteil	396-88226...	050	050	050	050	050	050				
Stand-by Netzteil	396-88117.050							x			
Bildrohrplatte	396-87832...		062	062	062		062	062	062	062	
Bildrohrplatte	396-88319...	052				051					
Frequenzweiche	396-85729...	077	072	077	077		077				
IR-Fernbedienung "Control 10/150"	263-87000...	060	060	060	060	060	071**	071			
IR-Fernbedienung "Control MM/D-BOX"	263-87000...								091	091	
EBS VGA Q2500	291-87808.006								x	x	
SAT-6-Nachrüstsatz	291-87809.055	x	x	x	x	x	x	x	x	x	NRS
Twin-SAT-6-Nachrüstsatz	291-87809.056	x	x	x	x	x	x	x	x	x	
DVB1-TV-Decoder-Nachrüstsatz	291-88251.050	x	x		x	x	x	x	x	x	
DVB + Twin-SAT-Nachrüstsatz	291-88251.051	x	x		x	x	x	x	x	x	
TVO 2-Nachrüstsatz	291-87782...	060	060		060	060	060		A/L51	A/L51	
TVO 3-Nachrüstsatz	291-88321...	050	050		050	050	050	050	A/L51	A/L51	
Dolby-Digital AC3 - Nachrüstsatz	291-88308.050	x	x	x	x			x	x	x	
VGA/IR - Nachrüstsatz	291-87808.050	x	x	x	x	x	x	x			
IR-Nachrüstsatz	291-88143.050	x	x	x	x	x					
HF-Sender	291-88035.050	x	x		x	x	x	x			

* gilt ab 30.03.02 bis 29.03.02 Var. 055 (für 61405.52/.62) bzw. 056 (für 61406.63)

** gilt ab 06.04.02 bis 05.04.02 Var. 060

Tabelle Basic-Board Art.-Nr. 88175.050-056

Pos.	Bestell-Nr.	Bestell-Bezeichnung	Varianten: 50	51	52	53	54	55	56
B535	85840.001	524 Kurzschluflbrücke (autom.)	1	1	1	1	1	1	
B540	85840.001	524 Kurzschluflbrücke (autom.)							1
B567	85840.001	524 Kurzschluflbrücke (autom.)	1						
B576	85840.001	524 Kurzschluflbrücke (autom.)	1						
B577	85840.001	524 Kurzschluflbrücke (autom.)	1						
B579	85840.001	524 Kurzschluflbrücke (autom.)		1	1	1	1	1	1
C531	25292	Kond. 2N7 J 2000V					1	1	
	25293	Kond. 3N0 J 2000V				1			
	26835	Kond. 2N2 J 2000V	1	1	1				
	28273	Kond. 470P J 2000V							1
C539	24639	Kond. 1N2 J 2000V	1						
	25300	Kond. 3N3 J 2000V			1				
	26372	Kond. 1N8 J 2000V							1
C541	25295	Kond. 9N4 H			1	1			
	25296	Kond. 8N8 H	1			1			
	26619	Kond. 9N1 H		1			1	1	
C542	24450	Kond. 600N J 250V				1	1		
	25886	Kond. 520N J 250V	1	1				1	
	73806	Kond. 900N J 160VW (250 V-)			1				1
C543	26531	Kond. 22N J 630V					1		

Tabelle Basic-Board Art.-Nr. 88175.050-056

			Varianten:						
Pos.	Bestell-Nr.	Bestell-Bezeichnung	50	51	52	53	54	55	56
C543	27012	Kond. 25N J 630V	1	1	1	1		1	1
C544	16573	Kond. 750N J 250V				1			
	25886	Kond. 520N J 250V							1
	28116	Kond. 680N J 250V		1				1	
	73806	Kond. 900N J 160VW (250 V-)	1		1		1		
C561	11762.020	Elko 22U S 250V	1						
C563	20257.020	Elko 220U M 50V		1	1	1	1	1	1
C577	12156.020	Kond. 1N5 J 63V	1						
	20455.020	Kond. 1N K 50V		1					
	21367.020	Kond. 2N2 K 50V R5			1	1	1	1	1
C579	12156.020	Kond. 1N5 J 63V	1						
	20455.020	Kond. 1N K 50V		1					
	23994.020	Kond. 470P K 1000V			1	1	1	1	1
D532	12657.Y10	Diode 3,0A 40V DO27			1				
	25838.Y10	Diode 3,0A 200V DO201AD UFAST-GP	1	1		1	1	1	1
D562	31818	Diode 1 N 4148 DO35		1					
D563	31818	Diode 1 N 4148 DO35		1					
H531	25316.050	UG2-Kabel kpl.	1		1	1	1	1	1
H532	29748	Focus-Kabel 500mm sw	1		1	1	1	1	1
H533	28954	Hochsp.-Kabel 800mm	1		1	1	1	1	1

Tabelle Basic-Board Art.-Nr. 88175.050-056

Pos.	Bestell-Nr.	Bestell-Bezeichnung	Varianten: 50	51	52	53	54	55	56
H533	29863	Hochsp.-Kabel 800mm		1					
H535	29749	Focus-Kabel 500mm rot	1		1	1	1	1	1
I561	26528	IC TDA8177		1	1	1	1	1	1
	29150	IC STV9379FA HEPTAWATT Vert.-Ablenkung	1						
L538	24475	Lin.-Regler 4,6uH					1		
	26787	Lin.-Regler		1					1
	27544	Lin.-Regler 5,4uH	1			1		1	
	29392	Lin.-Regler 4,6uH			1				
L553	17664	Dr. 20uH J (10.4.2001 - 29.3.2002)			1				
	22932	Dr. 38U K		1					
	27657	Dr. 44uH J	1			1	1	1	
	29486	Dr. 36uH J							1
	30724.Y06	Dr. 18uH J geschnitten (30.3.2002 - 31.12.2999)			1				
Q534	25708.Y20	Trans. POWBIPO ISOW218 vormontiert	1	1		1	1	1	1
	28864.Y20	Trans. 2SC5302			1				
R532	11093	Wid. 0R56 J 4W			1				
	21294	Wid. 0R68 J 4W	1	1		1	1	1	1
R559	29174.010	33R K 0207 0,33W WIDSI	1						
R564	20661	Wid. 470R J 0207		1					
R570	14985	Wid. 15K G 0204	1		1	1	1	1	1

Tabelle Basic-Board Art.-Nr. 88175.050-056

			Varianten:						
Pos.	Bestell-Nr.	Bestell-Bezeichnung	50	51	52	53	54	55	56
R570	20331	Wid. 22K G 0204		1					
R574	11091	Wid. 0R82 J 4W		1				1	
	11093	Wid. 0R56 J 4W	1						
	21294	Wid. 0R68 J 4W			1				
	22719	Wid. 1R J 2W				1	1		1
R577	77101	Wid. 10R J 0207		1					
R619	16662	DUO-PTC-Wid. 18R				1			1
	28729	DUO-PTC-Wid. 9R	1	1	1		1	1	
R659	14985	Wid. 15K G 0204		1					
	20328	Wid. 47K J 0204							1
	20331	Wid. 22K G 0204	1		1	1	1	1	
T531	28670	Zeilentrafo 32" Q24/25		1					
	29176	Zeilentrafo 28/29/32/40"Q25	1		1	1	1	1	
	30744	Zeilentrafo 32" Q2500							1
T639	28636	W-Trafo Q2400/Q2500 (146V)		1					
	28640	W-Trafo Q2400 (136V)	1		1	1	1	1	
	29751	W-Trafo Q2400 (120V) 32"							1
W545	82232.001	Flachstecker,gebogen "UG 2"		1					

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
U202	Tuner-ZF M Multisystem MN/BG-DK	Tuner	260-87271.051	
U203	Tuner-ZF EPAS Eurosys. m. Antennenspl.	Tuner	260-87998.050	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L202	Dr. 47uH K SMCC Fastron	Choke	298-16925	
L203	Dr. 4330 030 38100 VAL	Choke	298-14399	
L533	Fe-Dr. 0U7 6x5	Choke	298-27471.Y03	
L534	Dr. 150U K 10x15	Choke	298-79726.020	
L538	Lin.-Regler 4,6uH	Deflection Unit	278-24475	054
L538	Lin.-Regler	Deflection Unit	278-26787	055
L538	Lin.-Regler	Deflection Unit	278-26787	056
L538	Lin.-Regler 5,4uH	Deflection Unit	278-27544	050
L538	Lin.-Regler 5,4uH	Deflection Unit	278-27544	053
L538	Lin.-Regler 4,6uH	Deflection Unit	278-29392	052
L619	Dr. 820uH	Choke	298-28785	
T528	Spule Treiberspule	Coil	297-23664	
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	050
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	052
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	053
T531	Zeilentrafo 28/29/32/40"Q25	Line Transformer	276-29176	054
T531	Zeilentrafo 28/32/40" Q2500	Line Transformer	276-29176	055
T531	Zeilentrafo 32" Q2500	Line Transformer	276-30744	056
T540	Trafo AT 4043/67A	Power Transformer	490-21351	
T612	Dr. 2x 18mH5	Choke	298-17684	
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	050
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	052
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	053
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	054
T639	W-Trafo Q2400 (136V)	Power Transformer	490-28640	055
T639	W-Trafo Q2400 (120V) 32"	Power Transformer	490-29751	056
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
20	Aufsteckkühlkörper	Screening	509-27369	
30	Linsenschraube AM 3x10 brüniert	Screw	432-74571	050
30	Linsenschraube AM 3x10 brüniert	Screw	432-74571	052
30	Linsenschraube AM 3x10 brüniert	Screw	432-74571	055
H 01	Sicherungshalter für SI 5x20	Fuseholder Spring	730-20061	
H 02	Sicherungshalter für SI 5x20	Fuseholder Spring	730-20061	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
H474	Montageclip	Spring	739-87529.001	
H484	Montageclip	Spring	739-87529.001	
H534	Montageclip	Spring	739-87529.001	
H539	Montageclip	Spring	739-87529.001	
H560	Montageclip	Spring	739-87529.001	
H561	Montageclip	Spring	739-87529.001	
H562	Glimmerscheibe 16x21	Insulating Piece	421-10881	
H586	Montageclip	Spring	739-87529.001	
H587	Glimmerscheibe 16x21	Insulating Piece	421-10881	
H621	Kabelhalter	Cable Binding	530-29601	
H623	Montageclip	Spring	739-87529.001	
H624	Montageclip	Spring	739-87529.001	
H625	Glimmerscheibe 16x21	Insulating Piece	421-10881	
H652	Montageclip	Spring	739-87529.001	
H663	Montageclip	Spring	739-87529.001	
H671	Montageclip	Spring	739-87529.001	
H674	Montageclip	Spring	739-87529.001	
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
10	L 7808 ACV	Integrated Circuit	349-21780.Y20	
10	L 78S09CV geschnitten	Integrated Circuit	349-24013.Y18	
I474	TDA 7296	Integrated Circuit	349-28414	
I484	TDA 7296	Integrated Circuit	349-28414	
I561	TDA8177	Integrated Circuit	349-26528	052
I561	TDA8177	Integrated Circuit	349-26528	053
I561	TDA8177	Integrated Circuit	349-26528	054
I561	TDA8177	Integrated Circuit	349-26528	055
I561	TDA8177	Integrated Circuit	349-26528	056
I561	STV9379FA Vert. Ablenkung	Integrated Circuit	349-29150	050
I569	TL 431ACLP	Integrated Circuit	349-19817.020	
I611	TDA4605-3/TDA4605	Integrated Circuit	349-22113	
I663	L 7808ACV vormontiert	Integrated Circuit	349-21780.050	
I669	Opto-Koppler DIP4 80V 50/80mA	Coupler	353-28638	
I670	TL 431ACLP	Integrated Circuit	349-19817.020	
I674	TL 431ACLP	Integrated Circuit	349-19817.020	
I676	TL 431ACLP	Integrated Circuit	349-19817.020	
I691	L 78S09CV vormontiert	Integrated Circuit	349-24013.051	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	TRANSISTOREN	**TRANSISTORS**		
10	SILPOW TO220FP PNP 80V 3A 24W	Transistor	346-28633	
10	2SC5302 ISOW218 NPN 1500V 10A 50W	Transistor	346-28864	052
Q469	BC547B TO92	Transistor	346-74983.020	055
Q526	SILPLAN TO92 NPN 100V 2A 1W	Transistor	346-20796.020	
Q531	ZTX712 E-Line	Transistor	346-27659.020	
Q532	ZTX614 E-Line	Transistor	346-27660.020	
Q533	BF422 TO92	Transistor	346-11562.020	
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	050
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	053
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	054
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	055
Q534	POWBIPO ISOW218 vormontiert	Transistor	346-25708.Y20	056
Q534	2SC5302	Transistor	346-28864.Y20	052
Q562	POWMOS TO220FP NCH 50V 10A 30W	Transistor	346-18528	
Q582	BC556B	Transistor	346-74967.020	
Q585	BC547B TO92	Transistor	346-74983.020	
Q586	BD537 TO220A	Transistor	346-77764	
Q589	BC557B	Transistor	346-74878.020	
Q593	BC557B	Transistor	346-74878.020	
Q596	BC556B	Transistor	346-74967.020	
Q597	BC547B TO92	Transistor	346-74983.020	
Q624	POWMOS TO220 NCH 600V 8A	Transistor	346-28957	
Q663	POWMOS TO220FP NCH 50V 10A 30W	Transistor	346-18528	
Q674	POWMOS TO220FP NCH 50V 10A 30W	Transistor	346-18528	
Q681	BC557B	Transistor	346-74878.020	
Q682	SILPOW TO220FP PNP 80V 3A 24W	Transistor	346-28633.Y22	
	DIODEN	**DIODES**		
10	3,0A 40V DO27 Schottky	Diode	352-12657	
10	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.010	
10	10,0A 200V ISOWATT220AC	Diode	352-28625	
10	10,0A 200V geschnitten	Diode	352-28625.Y20	
10	3,0A 300V DO201AD UFAST-GP	Diode	352-29726	
D206	ZD 30V0 2%	Diode	352-15763	
D474	1 N 4148 DO35	Diode	352-31818	
D491	1 N 4148 DO35	Diode	352-31818	
D526	1 N 4148 DO35	Diode	352-31818	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	DIODEN	**DIODES**		
D527	EU 02V0	Diode	352-20289	
D531	1,0A 400V DO41 FAST-GP	Diode	352-20685	
D532	3,0A 40V DO27	Diode	352-12657.Y10	052
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	050
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	053
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	054
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	055
D532	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	056
D533	BA 157	Diode	352-44799	
D537	3,0A 40V DO27	Diode	352-12657.Y10	
D539	ESC011M	Diode	352-23667	
D541	BA 157	Diode	352-44799	
D546	BA 157	Diode	352-44799	
D547	BA 159	Diode	352-49148	
D548	1 N 4148 DO35	Diode	352-31818	
D549	ZD 30V0 2%	Diode	352-15763	
D557	1,0A 400V DO41 FAST-GP	Diode	352-20685	
D558	1,0A 400V DO41 FAST-GP	Diode	352-20685	
D561	BA 157	Diode	352-44799	
D569	ZD 12V0	Diode	352-44202	
D584	ZD 30V0 2%	Diode	352-15763	
D589	BA 157	Diode	352-44799	
D590	BA 157	Diode	352-44799	
D613	Gleichrichter B250 C3200/2200	Rectifier	354-22394	
D617	3,0A 1000V DO27A UFAST-GP	Diode	352-22712	
D622	BA 157	Diode	352-44799	
D623	STTA506F TO220	Diode	352-27866	
D636	BA 157	Diode	352-44799	
D652	BYT08PI-1000	Diode	352-28613	
D656	3,0A 300V DO201AD UFAST-GP	Diode	352-29726.Y10	
D660	ZD 12V0	Diode	352-44202	
D663	10,0A 200V vormontiert BYW-80	Diode	352-28625.050	
D666	0,5A 20V DO-35 SD103C	Diode	352-17741	
D670	ZD 30V0 2%	Diode	352-15763	
D671	STPS20L40CF ISOWATT220AB 2x10A	Diode	352-20296	
D672	ZD 3V9 DO35 5% 0,5W	Diode	352-10526	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	DIODEN	**DIODES**		
D680	ZD 100V0 DO-41 J 1,3W ZPY	Diode	352-28686	
D681	BA 157	Diode	352-44799	
D686	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	
D687	3,0A 200V DO201AD UFAST-GP	Diode	352-25838.Y10	
	POTENTIOMETER	**POTENTIOMETERS**		
P662	1K	Potentiometer	375-22863.020	
	SICHERUNGEN	**FUSES**		
F611	3150mA T 250V 5x20 H	Fuse	380-29649	
F656	3150mA F 250V 8x8	Fuse	380-26219.020	
F661	4000mA T 250V 8x8	Fuse	380-13809.020	
F672	5000mA T 250V 8x8	Fuse	380-27665.020	
F689	630mA T 250V 8x8	Fuse	380-13837.020	
	KONDENSATOREN	**CAPACITORS**		
C531	2N7 J 2000V	Capacitor	359-25292	054
C531	2N7 J 2000V	Capacitor	359-25292	055
C531	3N0 J 2000V	Capacitor	359-25293	053
C531	2N2 J 2000V	Capacitor	359-26835	050
C531	2N2 J 2000V	Capacitor	359-26835	052
C531	470P J 2000V	Capacitor	359-28273	056
C538	Elko 47U M 250V	Electrolytic Capacitor	360-22941	
C539	1N2 J 2000V	Capacitor	359-24639	050
C539	3N3 J 2000V	Capacitor	359-25300	052
C539	1N8 J 2000V	Capacitor	359-26372	056
C540	Elko 2U2 M 350V	Electrolytic Capacitor	360-28102.020	
C541	9N4 H	Capacitor	359-25295	052
C541	9N4 H	Capacitor	359-25295	056
C541	8N8 H	Capacitor	359-25296	050
C541	8N8 H	Capacitor	359-25296	053
C541	8N8 H	Capacitor	359-25296	055
C541	9N1 H	Capacitor	359-26619	054
C542	600N J 250V	Capacitor	359-24450	053
C542	600N J 250V	Capacitor	359-24450	054
C542	520N J 250V	Capacitor	359-25886	050
C542	520N J 250V	Capacitor	359-25886	055
C542	900N J 160VW (250 V-)	Capacitor	359-73806	052
C542	900N J 160VW (250 V-)	Capacitor	359-73806	056

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	KONDENSATOREN	**CAPACITORS**		
C543	22N J 630V	Capacitor	359-26531	054
C543	25N J 630V	Capacitor	359-27012	050
C543	25N J 630V	Capacitor	359-27012	052
C543	25N J 630V	Capacitor	359-27012	053
C543	25N J 630V	Capacitor	359-27012	055
C543	25N J 630V	Capacitor	359-27012	056
C544	750N J 250V	Capacitor	359-16573	053
C544	520N J 250V	Capacitor	359-25886	056
C544	680N J 250V	Capacitor	359-28116	055
C544	900N J 160VW (250 V-)	Capacitor	359-73806	050
C544	900N J 160VW (250 V-)	Capacitor	359-73806	052
C544	900N J 160VW (250 V-)	Capacitor	359-73806	054
C545	390P J 2000V	Capacitor	359-28868	
C546	470P K 1000V	Capacitor	357-23994.020	
C548	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C553	390P J 2000V	Capacitor	359-28868	
C561	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	050
C568	470N J 100V	Capacitor	359-28078.020	
C579	470P K 1000V	Capacitor	357-23994.020	052
C579	470P K 1000V	Capacitor	357-23994.020	053
C579	470P K 1000V	Capacitor	357-23994.020	054
C579	470P K 1000V	Capacitor	357-23994.020	055
C579	470P K 1000V	Capacitor	357-23994.020	056
C611	470N M 275VW	Capacitor	359-28292	
C612	KOFOL 470N M 310VW	Capacitor	359-29681	
C613	KOFOL 470N M 310VW	Capacitor	359-29681	
C614	KO-Y1 1N0 M 250V	Capacitor	357-29162	
C619	100N M 250VW	Capacitor	359-23372	
C620	Elko 330U M 450V	Electrolytic Capacitor	360-27891	
C621	470N J 100V	Capacitor	359-28078.020	
C624	820P J 2000V	Capacitor	359-26529	
C627	150P K 1600V	Capacitor	359-13943	
C628	22N J 630V	Capacitor	359-26531	
C630	100P K 500V	Capacitor	357-20272.020	
C639	KO-Y1 1N5 M 250V	Capacitor	357-29161	
C650	150P K 1600V	Capacitor	359-13943	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	KONDENSATOREN	**CAPACITORS**		
C651	Elko 47U M 250V	Electrolytic Capacitor	360-22941	
C682	680P K 500V	Capacitor	357-21183.020	
C689	680P K 500V	Capacitor	357-21183.020	
	WIDERSTÄNDE	**RESISTORS**		
10	0R1 K 0207 WIDSI	Resistor	366-10905	
R206	6K8 J 0207	Resistor	366-20652	
R207	5K6 J 0207	Resistor	366-28964	
R208	6K8 J 0207	Resistor	366-20652	
R209	5K6 J 0207	Resistor	366-28964	
R466	470R J 0617 3,00W	Resistor	367-20648	
R468	470R J 0617 3,00W	Resistor	367-20648	
R475	4R7 K 0207 WIDSI	Resistor	366-18416	
R477	10K F 0204	Resistor	367-20347	
R479	220R J 0207	Resistor	366-15679	
R485	4R7 K 0207 WIDSI	Resistor	366-18416	
R489	220R J 0207	Resistor	366-15679	
R491	3R3 K 0207 0,33W WIDSI	Resistor	366-11790	
R516	22R J 0207	Resistor	366-20655	
R517	22R J 0207	Resistor	366-20655	
R518	10R J 0207	Resistor	366-77101	
R521	3R3 K 0207 0,33W WIDSI	Resistor	366-11790	
R524	4K7 J 0207	Resistor	366-40343	
R525	4K7 J 0207	Resistor	366-40343	
R527	4K7 J 0207	Resistor	366-40343	
R528	4K7 J 0207	Resistor	366-40343	
R529	4K7 J 0207	Resistor	366-40343	
R530	4K7 J 0207	Resistor	366-40343	
R531	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R532	0R56 J 4W	Resistor	368-11093	052
R532	0R68 J 4,00W	Resistor	368-21294	050
R532	0R68 J 4,00W	Resistor	368-21294	053
R532	0R68 J 4,00W	Resistor	368-21294	054
R532	0R68 K 4,00W	Resistor	368-21294	055
R532	0R68 J 4,00W	Resistor	368-21294	056
R533	12R F 0207	Resistor	367-21330	
R534	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
R535	100K J 0207	Resistor	366-16330	
R536	10K F 0204	Resistor	367-20347	
R537	10K F 0204	Resistor	367-20347	
R538	100K J 0207	Resistor	366-16330	
R539	100K J 0207	Resistor	366-16330	
R540	47R J 0411 0,75W WIDSI	Resistor	368-28118	
R541	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R542	1K8 G 0204	Resistor	367-20334	
R543	1K5 J 0414 1W	Resistor	367-20657	
R544	2K2 K 0W5 0411 WIDM	Resistor	367-29791	
R545	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R546	220R J 0207	Resistor	366-15679	
R547	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
R549	150K G 0207	Resistor	367-10898	
R551	150K G 0207	Resistor	367-10898	
R553	220R J 0207	Resistor	366-15679	
R555	1K2 F 0204	Resistor	367-17324	
R557	1R0 J 0207 0,5W WIDSI	Resistor	366-28909	
R558	1R0 J 0207 0,5W WIDSI	Resistor	366-28909	
R559	33R K 0207 0,33W WIDSI	Resistor	367-29174.010	050
R560	10K F 0204	Resistor	367-20347	
R561	3K9 F 0204	Resistor	367-20341	
R563	470R J 0207	Resistor	366-20661	
R565	39K F 0204	Resistor	367-28894	
R566	82K G 0207	Resistor	367-10885	
R567	470R J 0207	Resistor	366-20661	
R569	470R J 0207	Resistor	366-20661	
R570	15K G 0204	Resistor	367-14985	
R571	5K6 G 0204	Resistor	367-20343	
R572	5K6 G 0204	Resistor	367-20343	
R573	4K7 J 0207	Resistor	366-40343	
R574	0R82 K 4,00W	Resistor	368-11091	055
R574	0R56 J 4W0	Resistor	368-11093	050
R574	0R68 J 4,00W	Resistor	368-21294	052
R574	1R J 2,00W	Resistor	368-22719	053
R574	1R J 2,00W	Resistor	368-22719	054

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
R574	1R J 2,00W	Resistor	368-22719	056
R578	82K G 0207	Resistor	367-10885	
R579	39K F 0204	Resistor	367-28894	
R581	10K F 0204	Resistor	367-20347	
R582	10K F 0204	Resistor	367-20347	
R583	220K F 0207	Resistor	367-28413	
R587	4K7 F 0204	Resistor	367-20346	
R588	10K F 0204	Resistor	367-20347	
R589	10K F 0204	Resistor	367-20347	
R590	10R J 0207	Resistor	366-77101	
R591	1R J 0207	Resistor	366-20649	
R592	1R J 0207	Resistor	366-20649	
R593	10R J 0207	Resistor	366-77101	
R594	1R K 0207 WIDSI	Resistor	366-12276	
R596	100K J 0207	Resistor	366-16330	
R598	100K J 0207	Resistor	366-16330	
R613	1R5 K 7,00W	Resistor	368-24602	
R619	DUO-PTC-Wid. 18R	PTC Resistor	372-16662	053
R619	DUO-PTC-Wid. 18R	PTC Resistor	372-16662	056
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	050
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	052
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	054
R619	DUO-PTC-Wid. 9R	PTC Resistor	372-28729	055
R621	56K J 0414 1,00W	Resistor	367-22396	
R622	820K J 0207	Resistor	366-16437	
R623	4K7 F 0204	Resistor	367-20346	
R625	680K J 0207	Resistor	367-27264	
R626	22R J 0207	Resistor	366-20655	
R627	10K F 0204	Resistor	367-20347	
R629	22R J 0207	Resistor	366-20655	
R634	680K J 0207	Resistor	367-27264	
R639	10M J 0414	Resistor	367-19664	
R651	18K G 0207	Resistor	367-11559	
R652	1R K 0207 WIDSI	Resistor	366-12276	
R653	100R J 0207	Resistor	366-73257	
R654	100R J 0207	Resistor	366-73257	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
R657	4K7 F 0204	Resistor	367-20346	
R658	4K7 F 0204	Resistor	367-20346	
R659	22K G 0204	Resistor	367-20331	050
R659	22K G 0204	Resistor	367-20331	052
R659	22K G 0204	Resistor	367-20331	053
R659	22K G 0204	Resistor	367-20331	054
R659	22K G 0204	Resistor	367-20331	055
R660	4K7 F 0204	Resistor	367-20346	
R661	4K7 F 0204	Resistor	367-20346	
R662	4K7 F 0204	Resistor	367-20346	
R663	220K F 0207	Resistor	367-28413	
R665	56K J 0414 1,00W	Resistor	367-22396	
R666	18K F 0204	Resistor	367-18527	
R668	4K7 F 0204	Resistor	367-20346	
R677	10K F 0204	Resistor	367-20347	
R678	10K F 0204	Resistor	367-20347	
R679	100K J 0207	Resistor	366-16330	
R681	3R3 J 0207	Resistor	366-77754	
R682	33R J 0207	Resistor	366-22944	
R683	470R J 0207	Resistor	366-20661	
R684	6K8 J 0207	Resistor	366-20652	
R685	68R J 3,00W	Resistor	367-22942	
R686	0R1 K 0207 WIDSI	Resistor	366-10905Y09	
R687	0R1 K 0207 WIDSI	Resistor	366-10905Y09	
R688	1R J 0207	Resistor	366-20649	
R689	1R J 0207	Resistor	366-20649	
R690	1R K 0207 WIDSI	Resistor	366-12276	
R691	100R J 0207	Resistor	366-73257	
R692	100R J 0207	Resistor	366-73257	
R693	220R J 0207	Resistor	366-15679	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
20	AC3-Modul kpl. Q2500	P.C.B	396-88228.050	054
20	AC3-Modul kpl. Q2500	P.C.B	396-88228.050	056
30	Audio-Erweiterung kpl. Q2500	P.C.B	396-88234.050	054
30	Audio-Erweiterung kpl. Q2500	P.C.B	396-88234.050	056
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
10	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	054
10	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	055
10	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	056
10	ICMOS OTP VSOP32 256Kx8	Integrated Circuit	350-28694	054
I 01	ICMOS CS4925 PLCC44	Integrated Circuit	350-28692	054
I 02	ICMOS CS4226 TQFP44	Integrated Circuit	350-28693	054
I 03	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	054
I 04	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	054
I 05	ICMOS OTP VSOP32 256Kx8 SW V1.0	Integrated Circuit	350-28694.050	054
I 06	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	054
I 07	MC33079 SO14	Integrated Circuit	350-28701	054
I 08	MC33079 SO14	Integrated Circuit	350-28701	054
I 09	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	054
I 10	ICMOS M34063A SO008	Integrated Circuit	350-28429	054
I 11	ICMOS 8575 SOT340 I/O-EXP.J2C	Integrated Circuit	350-29252	054
I 12	MC33078 SO8	Integrated Circuit	350-28702	054
I 13	ICMOS HCF4081B SO14	Integrated Circuit	350-28689	054
I 14	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	054
I 15	ICMOS 74LVC125APW TSSOP14	Integrated Circuit	350-28697	054
I 16	ICMOS 74LVC14APW TSSOP14	Integrated Circuit	350-28748	054
I 18	NJM2234 SSOP-8 VIDEO-SWITCH	Integrated Circuit	350-29253	054
I1631	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	
I1711	TEA6415 SO20L	Integrated Circuit	350-25733	
I1731	TEA6415 SO20L	Integrated Circuit	350-25733	
I1771	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	
I1851	TEA6420D SO28	Integrated Circuit	350-28564	
I1871	TEA6422D SO28	Integrated Circuit	350-25732	
I2051	ICMOS MSP3411 PQFP-80 SOUND	Integrated Circuit	350-29132	
I2056	MC 78L08ACP TO92	Integrated Circuit	349-24725.020	
I2091	MC33079 SO14	Integrated Circuit	350-28701	
I2151	ICMOS VPC3233 QFP80	Integrated Circuit	350-28573	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I2161	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2171	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2192	ICMOS 74LVC08 SO14 AND	Integrated Circuit	350-27928	
I2193	ICMOS 74LVC00A D SO14	Integrated Circuit	350-28990	
I2271	ICMOS VPC3230D MQFP80	Integrated Circuit	350-29177	
I2311	ICMOS SAA4979 QFP128 CONVER	Integrated Circuit	350-29128	
I2318	IC-VR 3V30 0A30 SOT223	Integrated Circuit	350-29462	
I2361	ICMOS 74LV00 D SO14	Integrated Circuit	350-28730	
I2411	IC-VR 2V50 0A50 SOT223	Integrated Circuit	350-29461	
I2421	ICMOS SAA4993 QFP160 FALCON	Integrated Circuit	350-29233	
I2451	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2461	ICMOS SAA4955HL LQFP44	Integrated Circuit	350-28823	
I2521	TDA9332H-N2 QFP-44 DEFLEC	Integrated Circuit	350-29481	055
I2521	TDA9332H-N2 QFP-44 DEFLEC	Integrated Circuit	350-29481	056
I2521	TDA9332H-N3 QFP-44 DEFLEC	Integrated Circuit	350-29801	053
I2521	TDA9332H-N3D QFP-44 DEFLEC	Integrated Circuit	350-29833	054
I2651	LM 358 SMD	Integrated Circuit	350-21521	
I2716	ICMOS 74HCT4052D SO16	Integrated Circuit	350-29463	
I2786	IC-VR 3V30 0A30 SOT223	Integrated Circuit	350-29462	
I2791	IC-VR 2V50 0A30 SOT223	Integrated Circuit	350-29460	
I2796	IC-VR 2V50 0A30 SOT223	Integrated Circuit	350-29460	
I2801	ICMOS SDA6000 MQFP128 TELTEX	Integrated Circuit	350-29127	
I2916	ICMOS 48LC4M# TSOP2 10ns SDRAM	Integrated Circuit	350-29137	
I2926	ICMOS M27V322-100XB1 100ns OTP	Integrated Circuit	349-29779	053
I2926	ICMOS M27V322-100XB1OTP SW V2.2	Integrated Circuit	349-29779.489	056
I2926	ICMOS M27V322-100XB1OTP SW V2.3	Integrated Circuit	349-29779.492	055
I2926	ICMOS M27V322-100XB1OTP SW V2.6	Integrated Circuit	349-29779.513	054
I2931	ICMOS 24C64 DIP-8 EEPROM 64KB I2C	Integrated Circuit	349-28114	
I2936	ICMOS 24256 DIP-8 256K EEPROM I2C	Integrated Circuit	349-29262	053
I2941	ICRES 2V75 J SO8 TS831	Integrated Circuit	350-29141	
I2946	ICRES 2V75 J SO8 TS831	Integrated Circuit	350-29141	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
H2926	IC-Fassung 42-pol. DIL	Socket	320-28410	
H2931	IC-Fassung 8-pol.	Socket	320-80503	
H2936	IC-Fassung 8-pol.	Socket	320-80503	
W 01	Cinchbuchse 4-fach quadratisch	Socket	323-29242	054

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	**SOCKETS**		
W 03	Cinchbuchsenleiste 3-fach schwarz	Socket	323-29664	054
W1101	SCART-Buchse	Socket	323-19542	
W1201	SCART-Buchse	Socket	323-19542	
W1301	SCART-Buchse	Socket	323-19542	
W1411	Kopfhörerbuchse Stereo	Socket	323-27782	
W1494	Cinchbuchse 2-fach vertikal rot/weiß	Socket	323-28893	
W1551	Connector 9-pol.	Contact Ledge	326-24474	
W1941	Buchse vertikal Mini DIN 8polig	Socket	323-28368	
W1961	Mini-DIN-Buchse 9-pol. stehend	Socket	323-29229	
	TRANSISTOREN	**TRANSISTORS**		
Q1142	BC847BW SOT323	Transistor	344-27272	
Q1152	BC857BW SOT323	Transistor	344-28404	
Q1161	BC817-25W SOT323	Transistor	344-28405	
Q1252	BC857BW SOT323	Transistor	344-28404	
Q1261	BC817-25W SOT323	Transistor	344-28405	
Q1432	BCW66H	Transistor	344-26051	
Q1433	BC857BW SOT323	Transistor	344-28404	
Q1446	BC857BW SOT323	Transistor	344-28404	
Q1453	BC847BW SOT323	Transistor	344-27272	
Q1461	BC847BW SOT323	Transistor	344-27272	
Q1473	BC847BW SOT323	Transistor	344-27272	
Q1483	BC857BW SOT323	Transistor	344-28404	
Q1491	BC847BW SOT323	Transistor	344-27272	
Q1493	BC847BW SOT323	Transistor	344-27272	
Q1496	BC847BW SOT323	Transistor	344-27272	
Q1498	BC847BW SOT323	Transistor	344-27272	
Q1581	BC847BW SOT323	Transistor	344-27272	
Q1586	BC847BW SOT323	Transistor	344-27272	
Q1773	BC847BW SOT323	Transistor	344-27272	
Q1776	BC857BW SOT323	Transistor	344-28404	
Q1782	BC857BW SOT323	Transistor	344-28404	
Q1784	BC857BW SOT323	Transistor	344-28404	
Q1792	BC847BW SOT323	Transistor	344-27272	
Q1814	BC847BW SOT323	Transistor	344-27272	
Q1834	BC847BW SOT323	Transistor	344-27272	
Q1849	BC847BW SOT323	Transistor	344-27272	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	TRANSISTOREN	**TRANSISTORS**		
Q1912	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q1916	BC857BW SOT323	Transistor	344-28404	
Q1922	BSV52 SOT23	Transistor	344-16207	
Q1928	BC807-25 SOT23	Transistor	344-16064	
Q1931	BC857BW SOT323	Transistor	344-28404	
Q2027	BC857BW SOT323	Transistor	344-28404	
Q2076	BC857BW SOT323	Transistor	344-28404	
Q2078	BC857BW SOT323	Transistor	344-28404	
Q2081	BC857BW SOT323	Transistor	344-28404	
Q2083	BC857BW SOT323	Transistor	344-28404	
Q2226	BC857BW SOT323	Transistor	344-28404	
Q2371	BC847BW SOT323	Transistor	344-27272	
Q2472	BC857BW SOT323	Transistor	344-28404	
Q2482	BC857BW SOT323	Transistor	344-28404	
Q2486	BC847BW SOT323	Transistor	344-27272	
Q2492	BC857BW SOT323	Transistor	344-28404	
Q2496	BC847BW SOT323	Transistor	344-27272	
Q2556	BC847BW SOT323	Transistor	344-27272	
Q2561	BC847BW SOT323	Transistor	344-27272	
Q2581	BC847BW SOT323	Transistor	344-27272	
Q2612	BC847BW SOT323	Transistor	344-27272	
Q2616	BC847BW SOT323	Transistor	344-27272	
Q2623	BC857BW SOT323	Transistor	344-28404	
Q2626	BC857BW SOT323	Transistor	344-28404	
Q2628	BC857BW SOT323	Transistor	344-28404	
Q2638	BC847BW SOT323	Transistor	344-27272	
Q2639	BC847BW SOT323	Transistor	344-27272	
Q2721	BC847BW SOT323	Transistor	344-27272	
Q2726	BC847BW SOT323	Transistor	344-27272	
Q2731	BC847BW SOT323	Transistor	344-27272	
Q2737	BC847BW SOT323	Transistor	344-27272	
Q2755	BC847BW SOT323	Transistor	344-27272	
Q2758	BC847BW SOT323	Transistor	344-27272	
Q2762	BC847BW SOT323	Transistor	344-27272	
Q2765	BC847BW SOT323	Transistor	344-27272	
Q2823	BC847BW SOT323	Transistor	344-27272	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	TRANSISTOREN	**TRANSISTORS**		
Q2831	BC847BW SOT323	Transistor	344-27272	
Q2853	BC847BW SOT323	Transistor	344-27272	
Q2856	BC857BW SOT323	Transistor	344-28404	
Q2886	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2891	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2893	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2902	BC847BW SOT323	Transistor	344-27272	
Q2951	BC847BW SOT323	Transistor	344-27272	
Q2953	BC857BW SOT323	Transistor	344-28404	
Q2957	BC847BW SOT323	Transistor	344-27272	
Q2961	BC847BW SOT323	Transistor	344-27272	
	DIODEN	**DIODES**		
D2074	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D2293	LL 103 C	Diode	351-16947	
D2863	0,2A 75V SOD80 LL4148	Diode	351-15015	
	QUARZE/FILTER	**QUARTZES**		
X2048	18,432000 MHz HC49U	Crystal Oscillator	385-25502	
X2181	20,250000 MHz HC49U	Crystal Oscillator	385-26686	
X2283	20,250000 MHz HC49U	Crystal Oscillator	385-26686	
X2336	12,000000 MHz HC49U CL=12PF	Crystal Oscillator	385-29247	
X2531	12,000000 MHz HC49U CL=12PF	Crystal Oscillator	385-29247	
X2876	6,000000 MHz HC49U CL=20PF	Crystal Oscillator	385-29248	
	SICHERUNGEN	**FUSES**		
R1979	PPTC-Sicherung 0A5 60V 7D5 5R1	Thermo Fuse	381-29532.020	053
R1979	PPTC-SICH. 0A5/1A0 60V 7D5 5R1	Thermo Fuse	381-29890.020	054
R1979	PPTC-SICH. 0A5/1A0 60V 7D5 5R1	Thermo Fuse	381-29890.020	055
R1979	PPTC-SICH. 0A5/1A0 60V 7D5 5R1	Thermo Fuse	381-29890.020	056
	WIDERSTÄNDE	**RESISTORS**		
R 37	4K7 F 0204 geschnitten	Resistor	367-20346.Y20	054
R1168	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1268	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R129	4K7 F 0204 geschnitten	Resistor	367-20346.Y20	054
R1347	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1380	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1711	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1731	10R J 0207 0,25W WIDSI	Resistor	366-20353	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
R1780	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1811	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1851	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1871	10R J 0207 0,25W WIDSI	Resistor	366-20353	
R1929	10R J 0207 0,25W WIDSI	Resistor	366-20353	
	SMD TEILE	**SMD PARTS**		
D 01	ZD 5V6 G 0W5 SOD-80 ZMM5.6	Diode	351-22580	054
D 02	1,0A 800V DO214AC FAST-GP	Diode	351-25542	054
D1237	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1416	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1564	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1717	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	053
D1717	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	055
D1717	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	056
D1919	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1922	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1931	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1932	0,2A 75V SOD80 LL4148	Diode	351-15015	
D1937	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D1981	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2031	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D2091	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D2092	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D2097	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2544	LL 103 C	Diode	351-16947	054
D2549	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2559	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2567	LL 103 C	Diode	351-16947	
D2572	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	
D2573	LL 103 C	Diode	351-16947	054
D2574	LL 103 C	Diode	351-16947	
D2581	ZD 20V0 J 0W5 SOD-80 ZMM20	Diode	351-22138	
D2582	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2586	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2591	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2592	0,2A 75V SOD80 LL4148	Diode	351-15015	

Signal Board Q2500 (H) Art.-Nr. 88176.053-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D2594	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2596	LL 103 C	Diode	351-16947	
D2607	ZD 20V0 J 0W5 SOD-80 ZMM20	Diode	351-22138	
D2611	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2618	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2631	LL 103 C	Diode	351-16947	
D2632	LL 103 C	Diode	351-16947	
D2657	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2661	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2667	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2735	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2781	LL 103 C	Diode	351-16947	
D2783	LL 103 C	Diode	351-16947	
D2856	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2857	LL 103 C	Diode	351-16947	
D2883	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2884	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2887	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2889	ZD 6V2 J 0W5 SOD-80 ZMM6.2	Diode	351-17534	054
D2930	ZD 5V6 G 0W5 SOD-80 ZMM5.6	Diode	351-22580	
D2964	0,2A 75V SOD80 LL4148	Diode	351-15015	
D2967	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q 01	BC847BW SOT323	Transistor	344-27272	054
Q 02	BC847BW SOT323	Transistor	344-27272	054
Q 04	BC847BW SOT323	Transistor	344-27272	054
Q 05	BC847BW SOT323	Transistor	344-27272	054
Q 06	BC847BW SOT323	Transistor	344-27272	054
Q 07	BC847BW SOT323	Transistor	344-27272	054
Q 08	BC857BW SOT323	Transistor	344-28404	054
Q 09	BC847BW SOT323	Transistor	344-27272	054
Q 10	BC857BW SOT323	Transistor	344-28404	054
Q 11	BC847BW SOT323	Transistor	344-27272	054
Q1013	BC847BW SOT323	Transistor	344-27272	
Q1014	BC847BW SOT323	Transistor	344-27272	
Q1015	BC857BW SOT323	Transistor	344-28404	
Q1158	BC847BW SOT323	Transistor	344-27272	

Signal Board Q2500 (H) Art.-Nr. 88176.053-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q1258	BC847BW SOT323	Transistor	344-27272	
Q1342	BC857BW SOT323	Transistor	344-28404	
Q1348	BC847BW SOT323	Transistor	344-27272	
Q1361	BC817-25W SOT323	Transistor	344-28405	
Q1381	BC847BW SOT323	Transistor	344-27272	
Q1386	BC847BW SOT323	Transistor	344-27272	
Q1441	BC847BW SOT323	Transistor	344-27272	
Q1466	BC857BW SOT323	Transistor	344-28404	
Q1551	BC857BW SOT323	Transistor	344-28404	
Q1552	BC847BW SOT323	Transistor	344-27272	
Q1556	BC847BW SOT323	Transistor	344-27272	
Q1637	BC847BW SOT323	Transistor	344-27272	
Q1641	BC847BW SOT323	Transistor	344-27272	
Q1644	BC857BW SOT323	Transistor	344-28404	
Q1651	BC847BW SOT323	Transistor	344-27272	
Q1654	BC857BW SOT323	Transistor	344-28404	
Q1666	BC857BW SOT323	Transistor	344-28404	
Q1671	BC847BW SOT323	Transistor	344-27272	
Q1771	BC847BW SOT323	Transistor	344-27272	
Q1824	BC847BW SOT323	Transistor	344-27272	
Q1901	BC857BW SOT323	Transistor	344-28404	
Q1903	BC857BW SOT323	Transistor	344-28404	
Q1906	BC857BW SOT323	Transistor	344-28404	
Q2476	BC847BW SOT323	Transistor	344-27272	
Q2594	BC847BW SOT323	Transistor	344-27272	
Q2671	BC847BW SOT323	Transistor	344-27272	
Q2741	BC847BW SOT323	Transistor	344-27272	
Q2746	BC847BW SOT323	Transistor	344-27272	
Q2752	BC847BW SOT323	Transistor	344-27272	
Q2768	BC847BW SOT323	Transistor	344-27272	
Q2772	BC847BW SOT323	Transistor	344-27272	
Q2775	BC847BW SOT323	Transistor	344-27272	
Q2778	BC847BW SOT323	Transistor	344-27272	
Q2862	BC847BW SOT323	Transistor	344-27272	
Q2883	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	
Q2888	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	

Signal Board Q2500 (H) Art.-Nr. 88176.053-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q2943	BC847BW SOT323	Transistor	344-27272	

Signal Board Q2500 (H) Art.-Nr. 88176.053-056

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q2966	BC857BW SOT323	Transistor	344-28404	

Bedienteil Control Unit Art.-Nr. 88117.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L8101	Relay 5V0 62R 16A 1-pol. 29x16x13	Relay	387-29279	050
T8101	Trafo Standby Q2500 EF16-4,7	Power Transformer	490-29284	050
	INTEGR.SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I8123	TL 431ACLP	Integrated Circuit	349-19817.020	050
I8131	VIPER12# SO8	Integrated Circuit	350-29281	050
	DIODEN	**DIODES**		
D8133	Gleichrichter DF 08 S	Rectifier	354-25837	050
I8122	OPTO-Koppler DIP4 80V 50/80mA	Coupler	353-28638	050
	SCHALTER	**SWITCHES**		
S8101	Netzschalter ARTICOS	Switch	471-29099	050
	SICHERUNGEN	**FUSES**		
F8133	630MA T 250V 8x8	Fuse	380-13837.020	050
	KONDENSATOREN	**CAPACITORS**		
C8133	Elko 4U7 M 400V	Electrolytic Capacitor	360-29280.020	050

Bedienteil Control Unit Art.-Nr. 88117.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D8103	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8106	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8114	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8121	1,0A 200V DO214AC FAST-GP LV030	Diode	351-25539	050
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	050
Q8111	BC847BW SOT323	Transistor	344-27272	050
Q8114	BC847BW SOT323	Transistor	344-27272	050

Bedienteil Control Module Art.-Nr. 88225.050-053

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L8101	Relay 5V0 62R 16A 1-pol.	Relay	387-29279	
T8101	Trafo Standby Q2500 EF16-4,7	Power Transformer	490-29284	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
H8207	554 Halter/Diode vorm.	Holder	602-84535.055	
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I8123	TL 431ACLP	Integrated Circuit	349-19817.020	
I8131	VIPER12# SO8 CHARGE	Integrated Circuit	350-29281	
I8216	IR-Empfänger (2-Farbstreifen)	Coupler	353-27396.Y20	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
W8321	kopfhörerbuchse (Klinke)	Socket	323-15966	051
W8321	Kombibuchse 8mm	Socket	323-27124	053
W8321	Kombibuchse 6,5mm	Socket	323-27415	050
W8321	Kombibuchse 6,5mm	Socket	323-27415	052
	DIODEN	**DIODES**		
D8133	Gleichrichter DF 08 S	Rectifier	354-25837	
D8206	LED 3mm rot low current	Coupler	353-22140	
D8207	LED 3mm grün low current	Coupler	353-22141	
I8122	Opto-Koppler DIP4 80V 50/80mA	Coupler	353-28638	
	SCHALTER	**SWITCHES**		
S8101	Netzschalter 8013 LORL	Switch	471-25599	
S8201	Taster vertikal (kurz)	Switch	467-17895	050
S8201	Taster vertikal (kurz)	Switch	467-17895	051
S8201	Taster vertikal (kurz)	Switch	467-17895	053
S8201	Taster (lang)	Switch	467-28135	052
S8202	Taster vertikal (kurz)	Switch	467-17895	050
S8202	Taster vertikal (kurz)	Switch	467-17895	051
S8202	Taster vertikal (kurz)	Switch	467-17895	053
S8202	Taster (lang)	Switch	467-28135	052
S8203	Taster vertikal (kurz)	Switch	467-17895	050
S8203	Taster vertikal (kurz)	Switch	467-17895	051
S8203	Taster vertikal (kurz)	Switch	467-17895	053
S8203	Taster (lang)	Switch	467-28135	052
	SICHERUNGEN	**FUSES**		
F8133	630mA T 250V 8x8	Fuse	380-13837.020	
	KONDENSATOREN	**CAPACITORS**		
C8133	Elko 4U7 M 400V	Electrolytic Capacitor	360-29280.020	

Bedienteil Control Module Art.-Nr. 88225.050-053

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D8106	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8111	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8112	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8114	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-25539	050
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	051
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	052
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	053
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	051
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	053
D8131	1,0A 200V DO214AC FAST-GP	Diode	351-29831	052
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	051
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	053
D8201	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8202	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8204	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8331	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	050
D8331	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	053
D8336	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	050
D8336	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	053
D8391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8392	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8491	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8492	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q8111	BC847BW SOT323	Transistor	344-27272	
Q8114	BC847BW SOT323	Transistor	344-27272	
Q8202	BC847BW SOT323	Transistor	344-27272	

Bedienteil Control Module Art.-Nr. 88226.050-051

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L8101	Relay 5V0 62R 16A 1-pol.	Relay	387-29279	
T8101	Trafo Standby Q2500 EF16-4,7	Power Transformer	490-29284	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
H8207	684 Halter/Diode vorm.	Holder	602-84535.052	050
H8207	554 Halter/Diode vorm.	Holder	602-84535.055	051
	INTEGR.SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I8123	TL 431ACLP	Integrated Circuit	349-19817.020	
I8131	VIPER12# SO8 CHARGE	Integrated Circuit	350-29281	
I8216	IR-Empfänger (2-Farbstreifen)	Coupler	353-27396.Y20	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
W8321	Kombibuchse 6,5mm	Socket	323-27415	051
W8321	Kombibuchse	Socket	323-28586	050
	DIODEN	**DIODES**		
D8133	Gleichrichter DF 08 S	Rectifier	354-25837	
D8206	LED 3mm rot low current	Coupler	353-22140	
D8207	LED 3mm grün low current	Coupler	353-22141	
I8122	Opto-Koppler DIP4 80V 50/80mA	Coupler	353-28638	
	SCHALTER	**SWITCHES**		
S8101	Netzschalter 8013 LORL	Switch	471-25599	
S8201	Taster (lang)	Switch	467-28135	
S8202	Taster (lang)	Switch	467-28135	
S8203	Taster (lang)	Switch	467-28135	
	SICHERUNGEN	**FUSES**		
F8133	630mA T 250V 8x8	Fuse	380-13837.020	
	KONDENSATOREN	**CAPACITORS**		
C8133	Elko 4U7 M 400V	Electrolytic Capacitor	360-29280.020	

Bedienteil Control Module Art.-Nr. 88226.050-051

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D8106	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8111	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8112	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8114	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-25539	051
D8121	1,0A 200V DO214AC FAST-GP	Diode	351-29831	050
D8131	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8138	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8201	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8202	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8204	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8331	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8336	ZD 12V0 J 0W5 SOD-80 ZMM12	Diode	351-17532	
D8391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8392	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8491	0,2A 75V SOD80 LL4148	Diode	351-15015	
D8492	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q8111	BC847BW SOT323	Transistor	344-27272	
Q8114	BC847BW SOT323	Transistor	344-27272	
Q8202	BC847BW SOT323	Transistor	344-27272	

Fernbedienung Remote Control Art.-Nr. 87000.091

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEBER-ERSATZTEILE	**SPARE PARTS FOR TRANSMITTER**		
10	ICMOS PIC16LC77 MQFP	Integrated Circuit	350-28769	091
10	Gehäuse-Oberteil Control MM	Cover	756-87213.011	091
20	Fenster	Window	666-87216.001	091
20	Batteriefeder 1-fach	Spring	739-85278.001	091
20	Batteriefeder vergoldet	Spring	739-87217.002	091
20	Gehäuse-Oberteil kpl.	Cover	756-87213.054	091
30	Display Control 1	Coupler	353-87219.001	091
30	Gummiknopf schwarz Joystick	Damping Rubber	406-27437	091
30	Micro-Joystick	Keyboard	466-27430	091
35	Zebra Gummi für Display	Spring Contact	309-87263.001	091
40	Kontaktmatte Controler MM	Spring Contact	309-87284.001	091
60	Klebefufl 40x4	Foam Plastics Ledge	411-18668	091
70	EJOT-PT-Schraube 1,8x6	Screw	440-27300	091
70	Gehäuse-Unterteil Control MM	Cover	756-87214.021	091
71	Knopf/Taster	Button	682-87288.001	091
80	Klebefufl 40X4	Foam Plastics Ledge	411-18668	091
85	Batteriefeder 2-fach	Spring	739-85279.001	091
90	Batteriedeckel arktis	Cover	756-87215.011	091

Fernbedienung Remote Control Art.-Nr. 87000.091

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPARE PARTS FOR TRANSMITTER			
C121	220U M 6V Elko	Electrolytic Capacitor	362-25508	091
C122	220U M 6V Elko	Electrolytic Capacitor	362-25508	091
D105	Diode BAS216 SOD110	Diode	351-27279	091
D121	Diode LED F.D.SFH 4515	Coupler	353-27024	091
D221	Diode LL 103 C	Diode	351-16947	091
I101	ICMOS PIC16LC77 MQFP Progr.	Integrated Circuit	350-28769.050	091
I212	ICMOS ZLDO330T8 SM8	Integrated Circuit	350-27367	091
Q112	BC847BW SOT323	Transistor	344-27272	091
Q124	BCX17 SOT23	Transistor	344-25509	091
Q126	BC857BW SOT323	Transistor	344-28404	091
Q216	BC857BW SOT323	Transistor	344-28404	091
Q217	BC857BW SOT323	Transistor	344-28404	091
X111	Ker.-Res. 4MHz mit Kond.	Ceramic Filter	386-28191	091
Z332	Taster	Switch	467-27429	091
Z334	Taster	Switch	467-27429	091
Z335	Taster	Switch	467-27429	091

IR-Fernbedienung IR remote control Art.-Nr. 87000.060

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEBER-ERSATZTEILE	**SPARE PARTS FOR TRANSMITTER**		
20	Batteriefeder	Spring	739-87217002	060
20	Gehäuse-Oberteil Arktis	Cover	756-87265001	060
25	Lichtleiter	Window	666-87274001	060
30	Kontaktmatte Control 150	Spring Contact	309-87267001	060
70	Gehäuse-Unterteil Arktis	Cover	756-87264001	060
80	Batteriefeder 2-fach	Sring	739-85279001	060
90	Batteriedeckl Arktis	Cover	756-87215001	060
D104	Diode BAS216 SOD110	Diode	351-27279	060
D117	LED LG T679 SMD	Coupler	353-27021	060
D118	LED LG T679 SMD	Coupler	353-27021	060
D121	Diode LED F.D.SFH 4515	Coupler	353-27024	060
I101	ICMOS HT48CA6 24SOP M-Contr. V1.0	Integrated Circiut	350-29859001	060
Q122	Transistor BCX17 SOT23	Transistor	344-25509	060
X111	Reson 3,580000 MHZ SMD mit Kont.	Ceramic Filter	386-29931	060

Fernbedienung Remote Control Art.-Nr. 87000.071

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEBER-ERSATZTEILE	**SPARE PARTS FOR TRANSMITTER**		
10	Gehäuse-Oberteil CONTROL 10	Cover	756-87213.006	071
20	Fenster	Window	666-87216.001	071
20	Batteriefeder vergoldet	Spring	739-87217.002	071
20	Gehäuse-Oberteil kpl. CONTROL 10	Cover	756-87213.056	071
30	Display CONTROL 10	Coupler	353-87219.011	071
40	Kontaktmatte CONTROL 10	Spring Contact	309-87218.102	071
70	EJOT-PT-Schraube 1,8x6	Screw	440-27300	071
70	Gehäuse-Unterteil	Cover	756-87214.011	071
80	Klebestreifen 40x4	Foam Plastics Ledge	411-18668	071
80	Batteriefeder 2-fach	Spring	739-85279.001	071
90	Batteriedeckel arktis	Cover	756-87215.011	071
D105	BAS216 SOD110	Diode	351-27279	071
D121	LED F.D.SFH 4515	Coupler	353-27024	071
I101	ICMOS PCA84C122AT-231	Integrated Circuit	350-27787	071
Q121	Trans. general SOT23 PNP 45V 500mA	Transistor	344-25509	071
X111	Piezo 4,300000 MHz MELF	Ceramic Filter	386-27022	071

Fernbedienung Remote Control Art.-Nr. 87000.071

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q404	BC857B SOT23	Transistor	344-14979	071
Q414	BC847B SOT23	Transistor	344-14974	071
Q416	BC847B SOT23	Transistor	344-14974	071

Bildrohrplatte CRT P.C.B Art.-Nr. 87832060-067

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L3226	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	060
L3226	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	062
L3226	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	067
L3366	Dr. 4U7 K 0,75A	Choke	298-14991	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
61	Montageclip Bildrohrpl.-IC's	Spring	739-23415	
	INTEGR.SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I3371	TDA6111	Integrated Circuit	349-23123	
I3381	TDA6111	Integrated Circuit	349-23123	
I3391	TDA6111	Integrated Circuit	349-23123	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
20	Bildrohrfassung	Socket	320-23997	062
20	Bildrohrfassung	Socket	320-24766	060
20	Bildrohrfassung	Socket	320-24766	063
20	Bildrohrfassung	Socket	320-24766	067
	TRANSISTOREN	**TRANSISTORS**		
Q3221	BC640	Transistor	346-25720.020	060
Q3221	BC640	Transistor	346-25720.020	062
Q3221	BC640	Transistor	346-25720.020	067
Q3222	BC639	Transistor	346-75622.020	060
Q3222	BC639	Transistor	346-75622.020	062
Q3222	BC639	Transistor	346-75622.020	067
	DIODEN	**DIODES**		
D3351	0,5A 20V DO-35 SD103C	Diode	352-17741	
D3367	1,0A 1000V DO204AL 1N4007	Diode	352-79585	
	KONDENSATOREN	**CAPACITORS**		
C3154	22U S 250V	Electrolytic Capacitor	360-11762.020	060
C3154	22U S 250V	Electrolytic Capacitor	360-11762.020	062
C3154	22U S 250V	Electrolytic Capacitor	360-11762.020	067
C3360	10N M 2000V	Capacitor	357-21868	
C3366	22U S 250V	Electrolytic Capacitor	360-11762.020	
C3367	22U S 250V	Electrolytic Capacitor	360-11762.020	
C3368	1N M 1000V	Capacitor	357-73102.020	
C3373	100N K 250V	Capacitor	359-26910.020	
C3383	100N K 250V	Capacitor	359-26910.020	
C3393	100N K 250V	Capacitor	359-26910.020	
	WIDERSTÄNDE	**RESISTORS**		
R3153	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	060
R3153	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	062

Bildrohrplatte CRT P.C.B Art.-Nr. 87832060-067

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
R3153	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	067
R3362	1K5 K 0411	Resistor	365-77586	
R3364	10R J 0207	Resistor	366-77101	
R3366	270R J 0414 WIDSI	Resistor	366-27623	
R3367	1M J 0207	Resistor	366-28054	
R3368	1K5 K 0411	Resistor	365-77586	
R3374	82K G 0207	Resistor	367-10885	
R3378	560R K 0411	Resistor	365-15309	
R3384	82K G 0207	Resistor	367-10885	
R3388	560R K 0411	Resistor	365-15309	
R3394	82K G 0207	Resistor	367-10885	
R3398	560R K 0411	Resistor	365-15309	
	SMD TEILE	**SMD PARTS**		
D3218	BA 592 SOD323	Diode	351-25810	060
D3218	BA 592 SOD323	Diode	351-25810	062
D3218	BA 592 SOD323	Diode	351-25810	067
D3219	BA 592 SOD323	Diode	351-25810	060
D3219	BA 592 SOD323	Diode	351-25810	062
D3219	BA 592 SOD323	Diode	351-25810	067
D3341	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3342	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3354	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3371	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3373	BAV103 IMPLOTEC-Diode	Diode	351-27246	
D3376	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3381	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3383	BAV103 IMPLOTEC-Diode	Diode	351-27246	
D3386	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3393	BAV103 IMPLOTEC-Diode	Diode	351-27246	
D3396	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q3157	BC856BW SOT323	Transistor	344-28629	060
Q3157	BC856BW SOT323	Transistor	344-28629	062
Q3157	BC856BW SOT323	Transistor	344-28629	067
Q3161	BC847BW SOT323	Transistor	344-27272	
Q3171	BC847BW SOT323	Transistor	344-27272	
Q3181	BC847BW SOT323	Transistor	344-27272	
Q3204	BC847BW SOT323	Transistor	344-27272	060
Q3204	BC847BW SOT323	Transistor	344-27272	062

Bildrohrplatte CRT P.C.B Art.-Nr. 87832060-067

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q3204	BC847BW SOT323	Transistor	344-27272	067
Q3211	BC857BW SOT323	Transistor	344-28404	060
Q3211	BC857BW SOT323	Transistor	344-28404	062
Q3211	BC857BW SOT323	Transistor	344-28404	067
Q3216	BC847BW SOT323	Transistor	344-27272	060
Q3216	BC847BW SOT323	Transistor	344-27272	062
Q3216	BC847BW SOT323	Transistor	344-27272	067
Q3341	BC857BW SOT323	Transistor	344-28404	
Q3343	BC847BW SOT323	Transistor	344-27272	

Bildrohrplatte CRT P.C.B Art.-Nr. 87832060-067

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q3376	BFN22 SOT23	Transistor	344-15349	060
Q3376	BFN22 SOT23	Transistor	344-15349	062
Q3376	BFN22 SOT23	Transistor	344-15349	067
Q3386	BFN22 SOT23	Transistor	344-15349	060
Q3386	BFN22 SOT23	Transistor	344-15349	062
Q3386	BFN22 SOT23	Transistor	344-15349	067
Q3396	BFN22 SOT23	Transistor	344-15349	060
Q3396	BFN22 SOT23	Transistor	344-15349	062
Q3396	BFN22 SOT23	Transistor	344-15349	067

Bildrohrplatte CRT P.C.B Art.-Nr. 88319.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L3366	Dr. 4U7 K 0,75A	Choke	298-14991	
L3428	Dr. EMV Typ RB 4-pol. 1A 50V 0,08 Ohm	Choke	298-28883	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
61	Montageclip Bildr.-Pl. IC's	Spring	739-23415	
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I3371	TDA6111	Integrated Circuit	349-23123	
I3381	TDA6111	Integrated Circuit	349-23123	
I3391	TDA6111	Integrated Circuit	349-23123	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
20	Bildrohrfassung FA ME	Socket	320-28089	051
20	Bildrohrfassung	Socket	320-29531	050
20	Bildrohrfassung	Socket	320-29531	052
	TRANSISTOREN	**TRANSISTORS**		
Q3424	BC640	Transistor	346-25720.020	
Q3434	BC639	Transistor	346-75622.020	
Q3444	BC640	Transistor	346-25720.020	
Q3454	BC639	Transistor	346-75622.020	
	DIODEN	**DIODES**		
D3351	0,5A 20V DO-35 SD103C	Diode	352-17741	
D3367	1,0A 1000V DO204AL 1N4007	Diode	352-79585	
	POTENTIOMETER	**POTENTIOMETERS**		
10	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666	050
10	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666	052
P3001	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666.Y20	050
P3001	45M M 0,5W lin. 20x22 steh.	Potentiometer	375-29666.Y20	052
	KONDENSATOREN	**CAPACITORS**		
C3360	10N M 2000V	Capacitor	357-21868	
C3366	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C3367	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C3368	1N M 1000V	Capacitor	357-73102.020	
C3373	100N K 250V	Capacitor	359-26910.020	
C3383	100N K 250V	Capacitor	359-26910.020	
C3393	100N K 250V	Capacitor	359-26910.020	
C3461	Elko 22U S 250V	Electrolytic Capacitor	360-11762.020	
C3463	220N J 100V	Capacitor	359-27013.020	

Bildrohrplatte CRT P.C.B Art.-Nr. 88319.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
R3360	22M J 0207	Resistor	367-28262	051
R3362	1K5 K 0411	Resistor	365-77586	
R3364	10R J 0207	Resistor	366-77101	
R3366	270R J 0414 WIDSI	Resistor	366-27623	
R3367	1M J 0207	Resistor	366-28054	
R3368	1K5 K 0411	Resistor	365-77586	
R3374	82K G 0207	Resistor	367-10885	
R3378	560R K 0411	Resistor	365-15309	
R3384	82K G 0207	Resistor	367-10885	
R3388	560R K 0411	Resistor	365-15309	
R3394	82K G 0207	Resistor	367-10885	
R3398	560R K 0411	Resistor	365-15309	
R3461	3R3 J 0207 0,50W WIDSI	Resistor	366-27701	
	SMD TEILE	**SMD PARTS**		
D3336	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3341	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3342	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3371	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3373	BAV103 IMPLOTEC-Diode	Diode	351-27246	
D3376	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3381	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3383	BAV103 IMPLOTEC-Diode	Diode	351-27246	
D3386	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3391	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3393	BAV103 IMPLOTEC-Diode	Diode	351-27246	
D3396	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3411	BA 592 SOD323	Diode	351-25810	
D3412	BA 592 SOD323	Diode	351-25810	
D3413	BA 592 SOD323	Diode	351-25810	
D3414	BA 592 SOD323	Diode	351-25810	
D3421	0,2A 75V SOD80 LL4148	Diode	351-15015	
D3451	0,2A 75V SOD80 LL4148	Diode	351-15015	
Q3161	BC847BW SOT323	Transistor	344-27272	
Q3171	BC847BW SOT323	Transistor	344-27272	
Q3181	BC847BW SOT323	Transistor	344-27272	

Bildrohrplatte CRT P.C.B Art.-Nr. 88319.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q3341	BC857BW SOT323	Transistor	344-28404	
Q3343	BC847BW SOT323	Transistor	344-27272	
Q3376	BFN22 SOT23	Transistor	344-15349	
Q3386	BFN22 SOT23	Transistor	344-15349	
Q3396	BFN22 SOT23	Transistor	344-15349	
Q3402	BC847BW SOT323	Transistor	344-27272	
Q3407	BC847BW SOT323	Transistor	344-27272	

Bildrohrplatte CRT P.C.B Art.-Nr. 88319.050-052

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q3413	BC857BW SOT323	Transistor	344-28404	
Q3421	BC846BW SOT323	Transistor	344-28895	
Q3431	BC856BW SOT323	Transistor	344-28629	
Q3441	BC846BW SOT323	Transistor	344-28895	
Q3451	BC856BW SOT323	Transistor	344-28629	
Q3462	BC856BW SOT323	Transistor	344-28629	
Q3467	BC847BW SOT323	Transistor	344-27272	

Tuner MN Q2500 Art.-Nr. 87271.051

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I4500	TDA5637 SOT340	Integrated Circuit	350-27278	051
I4600	TSA5523M SOT266	Integrated Circuit	350-27275	051
I4800	TDA9818 TS-SSOP24	Integrated Circuit	350-28463	051
	DIODEN	**DIODES**		
D4203	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4204	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4222	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4241	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4242	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4303	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4304	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4322	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4341	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4403	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4422	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4441	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4508	DIOVC 0A02 30V SOD323 BB640	Diode	351-26568	051
D4527	DIOVC 0A02 30V SOD323 BB639	Diode	351-26571	051
D4551	DIOVC 0A02 30V SOD323 BB535	Diode	351-26570	051
D4806	BAV 99W SOT323	Diode	351-27469	051

Tuner MN Q2500 Art.-Nr. 87271.051

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D4702	BA 592 SOD323	Diode	351-25810	051
D4703	BA 592 SOD323	Diode	351-25810	051
D4751	BA 592 SOD323	Diode	351-25810	051
D4752	BA 592 SOD323	Diode	351-25810	051
D4771	BA 592 SOD323	Diode	351-25810	051
D4772	BA 592 SOD323	Diode	351-25810	051
D4781	BA 592 SOD323	Diode	351-25810	051
D4832	BA 592 SOD323	Diode	351-25810	051
Q4702	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4709	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4752	Digital SOT323 NPN 50V 100mA 47K	Transistor	344-28555	051
Q4754	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4772	Digital SOT323 NPN 50V 100mA 47K	Transistor	344-28555	051
Q4774	Digital SOT323 NPN 50V 70mA 47K	Transistor	344-27270	051
Q4804	BC857BW SOT323	Transistor	344-28404	051
Q4832	BCR198W SOT323 PNP	Transistor	344-27269	051
Q4833	BC847BW SOT323	Transistor	344-27272	051

Tuner/ZF (EPAS) Tuner/IF Module (EPAS) Art.-Nr. 87998.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	VERBINDUNGSLEITUNG	**CONNECTING CABLES**		
50	Antennenkabel 240mm mit Winkelstecker	Connecting Cable	169-27470.001	050
	INTEGR.SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I4500	TDA5637 SOT340	Integrated Circuit	350-27278	050
I4600	TSA5523M SOT266	Integrated Circuit	350-27275	050
I4800	TDA9818 TS-SSOP24	Integrated Circuit	350-28463	050
	DIODEN	**DIODES**		
D4203	0A02 30V SOD323 BB640	Diode	351-26568	050
D4204	0A02 30V SOD323 BB535	Diode	351-26570	050
D4222	0A02 30V SOD323 BB640	Diode	351-26568	050
D4241	0A02 30V SOD323 BB640	Diode	351-26568	050
D4242	0A02 30V SOD323 BB535	Diode	351-26570	050
D4303	0A02 30V SOD323 BB639	Diode	351-26571	050
D4304	0A02 30V SOD323 BB535	Diode	351-26570	050
D4322	0A02 30V SOD323 BB639	Diode	351-26571	050
D4341	0A02 30V SOD323 BB639	Diode	351-26571	050
D4403	0A02 30V SOD323 BB535	Diode	351-26570	050
D4422	0A02 30V SOD323 BB535	Diode	351-26570	050
D4441	0A02 30V SOD323 BB535	Diode	351-26570	050
D4508	0A02 30V SOD323 BB640	Diode	351-26568	050
D4527	0A02 30V SOD323 BB639	Diode	351-26571	050
D4551	0A02 30V SOD323 BB535	Diode	351-26570	050
D4806	BAV 99W SOT323	Diode	351-27469	050

Tuner/ZF (EPAS) Tuner/IF Module (EPAS) Art.-Nr. 87998.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	QUARZE/FILTER	**QUARTZES**		
X4710	OFW-FILTER G3962	Filter	290-19700	050
	SMD TEILE	**SMD PARTS**		
Q4804	BC857BW SOT323	Transistor	344-28404	050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
U100	SAT-Tuner DVB/FM BS2W7HG1002	Scaffolding Access.	291-28502	050
U100	SAT-Tuner DVB/FM BS2W7HG1002	Scaffolding Access.	291-28502	052
U240	SAT-Tuner SF1218/SH	Tuner	260-28462	051
U700	SAT-Tuner SF1218/SH	Tuner	260-28462	050
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I150	IC MAX4546CSE SO16 RF/Video Switch	Integrated Circuit	350-28499	052
I300	IC LM2574M-ADJ 0,5A M14B	Integrated Circuit	350-28497	
I320	IC LM 2903D SO08	Integrated Circuit	350-21674	
I360	ICMOS SAA1300 SOT142-1	Integrated Circuit	349-28501	
I400	IC TSA5523M SOT266	Integrated Circuit	350-27275	050
I400	IC TSA5523M SOT266	Integrated Circuit	350-27275	052
I450	IC LM 358 SMD	Integrated Circuit	350-21521	050
I450	IC LM 358 SMD	Integrated Circuit	350-21521	052
I700	IC STV0056A DIP56Shrink	Integrated Circuit	349-28504	
I800	IC LM2574M-ADJ 0,5A M14B	Integrated Circuit	350-28497	050
I820	IC LM 2903D SO08	Integrated Circuit	350-21674	050
I860	ICMOS SAA1300 SOT142-1	Integrated Circuit	349-28501	050
I900	IC TDA6151 SO20	Integrated Circuit	350-23124	050
	QUARZE/FILTER	**QUARTZES**		
X789	Quarz 4,000000 MHz HC49U	Crystal Oscillator	385-20171	
	WIDERSTÄNDE	**RESISTORS**		
R301	1R J 0207	Resistor	367-24709.020	
R801	1R J 0207	Resistor	367-24709.020	050
	SMD TEILE	**SMD PARTS**		
D301	3,0A 40V SOD6 Schottky	Diode	351-28529	051
D301	3,0A 40V SOD6 Schottky	Diode	351-28529	052
D303	1,0A 600V	Diode	351-20547	051
D303	1,0A 600V	Diode	351-20547	052
D338	ZD 5V6 SOD80 ZMM B ITT	Diode	351-22580	051
D338	ZD 5V6 SOD80 ZMM B ITT	Diode	351-22580	052
D376	LL4148 SOD80	Diode	351-15015	
D381	LL4148 SOD80	Diode	351-15015	
D613	LL4148 SOD80	Diode	351-15015	
D613	BAS316 SOD323	Diode	351-27952	051
D614	BAS316 SOD323	Diode	351-27952	051
D616	BAS316 SOD323	Diode	351-27952	051
D624	BAS316 SOD323	Diode	351-27952	051
D626	LL4148 SOD80	Diode	351-15015	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D626	BAS316 SOD323	Diode	351-27952	051
D627	BAS316 SOD323	Diode	351-27952	051
D876	LL4148 SOD80	Diode	351-15015	050
D881	LL4148 SOD80	Diode	351-15015	050
Q103	SI2302DS MOSF. N- 1,25W SOT23	Transistor	344-28503	050
Q103	SI2302DS MOSF. N-Kanal 1,25W SOT23	Transistor	344-28503	052
Q104	SI2302DS MOSF. N-Kanal 1,25W SOT23	Transistor	344-28503	050
Q104	SI2302DS MOSF. N-Kanal 1,25W SOT23	Transistor	344-28503	052
Q107	BC847BW SOT323	Transistor	344-27272	050
Q107	BC847BW SOT323	Transistor	344-27272	052
Q108	BCR148W SOT323	Transistor	344-27270	050
Q108	BCR148W SOT323	Transistor	344-27270	052
Q109	BCR148W SOT323	Transistor	344-27270	050
Q109	BCR148W SOT323	Transistor	344-27270	052
Q121	BC847BW SOT323	Transistor	344-27272	050
Q121	BC847BW SOT323	Transistor	344-27272	052
Q316	BCR148W SOT323	Transistor	344-27270	
Q318	BC847BW SOT323	Transistor	344-27272	
Q334	BC847BW SOT323	Transistor	344-27272	
Q340	BC847BW SOT323	Transistor	344-27272	
Q352	BC847BW SOT323	Transistor	344-27272	
Q354	BC847BW SOT323	Transistor	344-27272	
Q364	BCR148W SOT323	Transistor	344-27270	
Q366	BCR148W SOT323	Transistor	344-27270	
Q367	BCR148W SOT323	Transistor	344-27270	
Q368	BCR148W SOT323	Transistor	344-27270	
Q374	BC847BW SOT323	Transistor	344-27272	
Q377	BC847BW SOT323	Transistor	344-27272	
Q392	BCR148W SOT323	Transistor	344-27270	
Q393	BC847BW SOT323	Transistor	344-27272	
Q553	BC847BW SOT323	Transistor	344-27272	
Q658	BC857W SOT323	Transistor	344-27468	050
Q658	BC857BW SOT323	Transistor	344-28404	051
Q658	BC857W SOT323	Transistor	344-27468	052
Q679	BC857W SOT323	Transistor	344-27468	050
Q679	BC857BW SOT323	Transistor	344-28404	051
Q679	BC857W SOT323	Transistor	344-27468	052
Q712	BF799LK	Transistor	344-17798	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q723	BC857W SOT323	Transistor	344-27468	050
Q723	BC857BW SOT323	Transistor	344-28404	051
Q723	BC857W SOT323	Transistor	344-27468	052
Q752	BC847B SOT23	Transistor	344-14974	
Q757	BC847B SOT23	Transistor	344-14974	050
Q816	BCR148W SOT323	Transistor	344-27270	050
Q818	BC847BW SOT323	Transistor	344-27272	050
Q834	BC847BW SOT323	Transistor	344-27272	050
Q840	BC847BW SOT323	Transistor	344-27272	050
Q841	BCR148W SOT323	Transistor	344-27270	050
Q842	BC847BW SOT323	Transistor	344-27272	050
Q852	BC847BW SOT323	Transistor	344-27272	050
Q854	BC847BW SOT323	Transistor	344-27272	050
Q864	BCR148W SOT323	Transistor	344-27270	050
Q866	BCR148W SOT323	Transistor	344-27270	050
Q867	BCR148W SOT323	Transistor	344-27270	050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q868	BCR148W SOT323	Transistor	344-27270	050
Q874	BC847BW SOT323	Transistor	344-27272	050
Q877	BC847BW SOT323	Transistor	344-27272	050
Q913	BC847BW SOT323	Transistor	344-27272	050
Q927	BC847BW SOT323	Transistor	344-27272	050
Q933	BC857W SOT323	Transistor	344-27468	050
Q934	BC847BW SOT323	Transistor	344-27272	050
Q941	BC857W SOT323	Transistor	344-27468	050
Q943	BC847BW SOT323	Transistor	344-27272	050
Q948	BC857B SOT23	Transistor	344-14979	050
Q952	BC857W SOT323	Transistor	344-27468	050
Q957	BC847BW SOT323	Transistor	344-27272	050
Q969	BCR198W SOT323	Transistor	344-27269	050
Q971	BC857W SOT323	Transistor	344-27468	050
Q976	BC847B SOT23	Transistor	344-14974	050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	**SOCKETS**		
W1	Cinchbuchse 4-fach quadratisch	Socket	323-29242	050
W3	Cinchbuchsenleiste 3-fach schwarz	Socket	323-29664	050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	ALLGEM.MECHAN.TEILE	**COMMON MECHANICAL PARTS**		
14	Wärmeleitfolie 10x10mm	Plasticband	190-29724.001	050
15	Wärmeleitfolie 25X25MM	Plasticband	190-29724.002	050
	INTEGR.SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I7051	ICMOS STI5500BVA/BVB PQSP208	Integrated Circuit	350-27822	050
I7081	IC 3.3V 0,8A SO08 Volt. Regulator	Integrated Circuit	350-27212	050
I7091	IC 3.3V 0,8A SO08 Volt. Regulator	Integrated Circuit	350-27212	050
I7251	ICMOS 74 HCT125 SMD	Integrated Circuit	350-15523	050
I7301	ICMOS KM416V# TSOP50 60ns DRAM	Integrated Circuit	350-28457	050
I7311	ICMOS KM416V# TSOP50 60ns DRAM	Integrated Circuit	350-28457	050
I7321	ICMOS AT 29LV010A-15TC/20TC/25TC	Integrated Circuit	350-27821	050
I7331	ICMOS TE28F008B3T90 TSOP40	Integrated Circuit	350-28456	050
I7341	ICMOS TE28F008B3T90 TSOP40	Integrated Circuit	350-28456	050
I7371	ICMOS KM416S# TSOP50 80ns SDRAM	Integrated Circuit	350-28459	050
I7381	ICMOS KM416S# TSOP50 80ns SDRAM	Integrated Circuit	350-28459	050
I7431	ICMOS MK2727STR SO-8	Integrated Circuit	350-28090	050
I7551	IC UC3843# SO8 V-CONT	Integrated Circuit	350-29258	050
I7577	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	050
I7701	IC 3.3V 0,8A SO08 Volt. Regulator	Integrated Circuit	350-27212	050
I7721	IC STV0299B TQFP64	Integrated Circuit	350-29049	050
I7861	ICMOS CS 4334 SO8	Integrated Circuit	350-27826	050
I7901	IC LM2574M-ADJ 0,5A M14B	Integrated Circuit	350-28497	050
I7931	IC-VR 12V00 G 0A25 CDT120 4931	Integrated Circuit	350-29256	050
I7981	I.C. TL 7702 ACD SO-8 LV 030	Integrated Circuit	350-27827	050
	QUARZE/FILTER	**QUARTZES**		
X7436	13,500000 MHz HC49U	Crystal Oscillator	385-18287	050
X7758	4,000000 MHz HC49U	Crystal Oscillator	385-17297	050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D7206	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7212	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7232	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7239	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7242	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7249	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7346	0,2A 75V SOD80 LL4148	Diode	351-15015	050
D7465	LL 103 C	Diode	351-16947	050
D7466	LL 103 C	Diode	351-16947	050
D7554	3,0A 40V SOD6 Schottky	Diode	351-28529	050
D7761	1,0A 600V	Diode	351-20547	050
D7902	3,0A 40V SOD6 Schottky	Diode	351-28529	050
Q7156	BC847BW SOT323	Transistor	344-27272	050
Q7201	BC857BW SOT323	Transistor	344-28404	050
Q7211	BC847BW SOT323	Transistor	344-27272	050
Q7230	BC857BW SOT323	Transistor	344-28404	050
Q7231	BC847BW SOT323	Transistor	344-27272	050
Q7235	BC857BW SOT323	Transistor	344-28404	050
Q7240	BC857BW SOT323	Transistor	344-28404	050
Q7241	BSV52 SOT23	Transistor	344-16207	050
Q7245	BC857BW SOT323	Transistor	344-28404	050
Q7257	BC847BW SOT323	Transistor	344-27272	050
Q7341	BC857BW SOT323	Transistor	344-28404	050
Q7551	17NE03# TO252 17A0 30V NCH	Transistor	344-29257	050
Q7577	SN7002 SOT23 0A19 60V NCH	Transistor	344-29134	050
Q7580	BC847BW SOT323	Transistor	344-27272	050
Q7581	BC857BW SOT323	Transistor	344-28404	050
Q7586	BC847BW SOT323	Transistor	344-27272	050
Q7592	BC847BW SOT323	Transistor	344-27272	050
Q7812	BC857BW SOT323	Transistor	344-28404	050
Q7822	BC857BW SOT323	Transistor	344-28404	050
Q7832	BC857BW SOT323	Transistor	344-28404	050
Q7842	BC857BW SOT323	Transistor	344-28404	050
Q7852	BC857BW SOT323	Transistor	344-28404	050

Frequenzweiche Cross-over network Art.-Nr. 85729.072

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPEZIALTEILE	**SPECIAL PARTS**		
L 01	Dr. 1mH8	Choke	298-22671	072
N 05	Kabelbaum 3/2-pol. 150lg. UL NAT	Connecting Cable	171-88432.051	072
N 08	Kabelbaum 3/2-pol. 150lg. UL NAT	Connecting Cable	171-88432.051	072

Frequenzweiche Cross-over network Art.-Nr. 85729.072

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
W 01	Stiftwanne vert. 3-p. natur	Contact Ledge	326-28095	072

Frequenzweiche Cross-over network Art.-Nr. 85729.077

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPEZIALTEILE	**SPECIAL PARTS**		
N05	Kabelbaum 3/2-pol. 200lg. UL natur	Connecting Cable	171-88432.059	077
R01	4R7 K 5,00W	Resistor	368-25590	077
W01	Stiftwanne vert. 3-pol. natur	Contact Ledge	326-28095	077

Frequenzweiche Cross-over network Art.-Nr. 85729.077

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.

AC3-Modul AC3 Module Art.-Nr. 88228.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
10	ICMOS OTP VSOP32 256KX8	Integrated Circuit	350-28694	050
I001	ICMOS CS4925 PLCC44	Integrated Circuit	350-28692	050
I002	ICMOS CS4226 TQFP44	Integrated Circuit	350-28693	050
I003	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	050
I004	ICMOS 74LVC574APW TSOP20	Integrated Circuit	350-28695	050
I005	ICMOS OTP VSOP32 256KX8 SW V1.0	Integrated Circuit	350-28694050	050
I006	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	050
I007	MC33079 SO14	Integrated Circuit	350-28701	050
I008	MC33079 SO14	Integrated Circuit	350-28701	050
I009	ICMOS HEF4053D SO16	Integrated Circuit	350-24881	050
I010	ICMOS M34063A SO008	Integrated Circuit	350-28429	050
I011	ICMOS 8575 SOT340 I/O-EXP.J2C	Integrated Circuit	350-29252	050
I012	MC33078 SO8	Integrated Circuit	350-28702	050
I013	ICMOS HCF4081B SO14	Integrated Circuit	350-28689	050
I014	ICMOS SSM2404 SO20	Integrated Circuit	350-28699	050
I015	ICMOS 74LVC125APW TSSOP14	Integrated Circuit	350-28697	050
I016	ICMOS 74LVC14APW TSSOP14	Integrated Circuit	350-28748	050
I018	NJM2234 SSOP-8 Video-Switch	Integrated Circuit	350-29253	050

AC3-Modul AC3 Module Art.-Nr. 88228.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
D001	DIOZD 5V6 G 0W5 SOD-80 ZMM5.6	Diode	351-22580	050
D002	1,0A 800V DO214AC FAST-GP	Diode	351-25542	050
Q001	BC847BW SOT323	Transistor	344-27272	050
Q002	BC847BW SOT323	Transistor	344-27272	050
Q004	BC847BW SOT323	Transistor	344-27272	050
Q005	BC847BW SOT323	Transistor	344-27272	050
Q006	BC847BW SOT323	Transistor	344-27272	050
Q007	BC847BW SOT323	Transistor	344-27272	050
Q008	BC857BW SOT323	Transistor	344-28404	050
Q009	BC847BW SOT323	Transistor	344-27272	050
Q010	BC857BW SOT323	Transistor	344-28404	050
Q011	BC847BW SOT323	Transistor	344-27272	050

VGA/IR-Modul VGA/IR Module Art.-Nr. 87717.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I811	ICMOS 74HCT 86 SO14	Integrated Circuit	350-16065	050
I891	ICMOS 74HCT 00 SO14	Integrated Circuit	350-15555	050
I896	SN74LS92D SO14 TTL	Integrated Circuit	350-28484	050
	BUCHSEN/FASSUNGEN	**SOCKETS**		
W801	Subminiatur-Buchse 15-pol.	Socket	323-28415	050
W876	Kopfhörerbuchse 2,5mm	Socket	323-27389	050
W881	Kopfhörerbuchse 3,5mm Mono	Socket	323-28672	050
	QUARZE/Filter	**QUARTZES**		
X893	Piezo Filter 429,0KHz	Ceramic Filter	386-18622	050

VGA/IR-Modul VGA/IR Module Art.-Nr. 87717.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	WIDERSTÄNDE	**RESISTORS**		
10	33R J 0207	Resistor	366-22944	050
R882	33R geschnitten	Resistor	366-22944.Y01	050
	SMD TEILE	**SMD PARTS**		
D876	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	050
D877	ZD 5V6 J 0W5 SOD-80 ZMM5.6	Diode	351-16758	050
D887	Diode 0,2A 75V SOD80 LL4148	Diode	351-15015	050
Q881	BC807-25 SOT23	Transistor	344-16064	050

VGA/IR-Modul VGA/IR Module Art.-Nr. 87717.070

VGA/IR-Modul VGA/IR Module Art.-Nr. 87717.070

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
20	Lpl. IR-Adapter kpl. Q24/25	P.C.B	396-87717.070	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
21	Haltewinkel	Angle	592-88127.001	
22	Schraube schwarz CM3,0X6 DIN 7500 ST	Screw	432-26944	
	GEHÄUSETEILE	**CABINET MOUNTING**		
10	Abdeckung SCART Q25M/H	Mask	703-87728.001	
11	Schraube schwarz CM3,0X6 DIN 7500 ST	Screw	432-26944	
25	Neoprenstanzteil 15x10x6 selbstklebend	Foam Plastics Ledge	411-22286.002	
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
I891	ICMOS 74HCT 00 SO14	Integrated Circuit	350-15555	070
I896	SN74LS92D SO14 TTL	Integrated Circuit	350-28484	070
	BUCHSEN/FASSUNGEN	**SOCKETS**		
W881	Kopfhörerbuchse 3,5mm Mono	Socket	323-28672	070
	QUARZE/FILTER	**QUARTZES**		
X893	Piezo Filter 429,0KHz	Ceramic Filter	386-18622	070
	WIDERSTÄNDE	**RESISTORS**		
10	33R J 0207	Resistor	366-22944	070
R882	33R geschnitten	Resistor	366-22944.Y01	070
	SMD TEILE	**SMD PARTS**		
D887	0,2A 75V SOD80 LL4148	Diode	351-15015	070
Q881	BC807-25 SOT23	Transistor	344-16064	070

TVO-Modul Art.-Nr. 87647.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L071	Dr. 270U J DR270/5 R5	Choke	298-26895	050
L886	Übertrager 2-fach ISDN SMD	Coil	297-28418	050
L887	EMV-Drossel ARRAY ISDN SMD	Coil	297-28419	050
	INTEGR.SCHALTUNGEN	**INTEGRATED CIRCUITS**		
10	ICMOS LT1086CT-3.3 TO220	Integrated Circuit	349-28421	050
10	ICMOS AT 89C51 PLCC44	Integrated Circuit	350-27378	050
10	ICMOS AT29C020-12JC PLCC32	Integrated Circuit	350-28422	050
I051	ICMOS LT1086CT-3.3 TO220	Integrated Circuit	349-28421Y21	050
I052	IC 3.3V 1,5A DD-P Volt.Regulat.	Integrated Circuit	350-28739030	050
I061	ICMOS M34063A SO008	Integrated Circuit	350-28429	050
I101	ICMOS ELAN SC400 - 100 AC BGA292	Integrated Circuit	350-28428	050
I201	ICMOS DRAM 64MB			
	4MX16 60NS 3,3V TSOP050	Integrated Circuit	350-28427	050
I206	ICMOS DRAM 64MB			
	4MX16 60NS 3,3V TSOP050	Integrated Circuit	350-28427	050
I211	ICMOS 74ALVC164245 SSOP48	Integrated Circuit	350-28426	050
I231	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I236	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I241	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I251	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I256	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	050
I266	ICMOS 74ACT139 SO016	Integrated Circuit	350-28431	050
I271	ICMOS AM29F016B-120 F4C TSOP40	Integrated Circuit	350-28720	050
I276	ICMOS AM29F016B-120 F4C TSOP40	Integrated Circuit	350-28720	050
I281	ICMOS AM29F016B-120 E4C TSOP40	Integrated Circuit	350-28430	050
I286	ICMOS AM29F016B-120 E4C TSOP40	Integrated Circuit	350-28430	050
I291	ICMOS 29C020-12JC PROGR. V1.0	Integrated Circuit	350-28422050	050
I511	ICMOS CYPERPRO 5050 QFP208	Integrated Circuit	350-28425	050
I561	ICMOS KM4132G512Q-8/G0 FP100	Integrated Circuit	350-28432	050
I641	ICMOS CS4297-JQ TQFP48	Integrated Circuit	350-28434	050
I691	ICMOS 74 ABT 16245CSSC SSOP	Integrated Circuit	350-28635	050
I701	ICMOS FDC37C932 QFL160	Integrated Circuit	350-28435	050
I711	ICMOS 89C51 PROGR. V1.8	Integrated Circuit	350-27378058	050
I726	ICMOS 74ACT14 SO014	Integrated Circuit	350-28436	050
I791	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	050
I818	ICMOS 74 HCT126 SO14 SMD	Integrated Circuit	350-28664	050
I841	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	050
I866	ICMOS PSB2115 H V 1.1 QFP64	Integrated Circuit	350-28439	050
I911	ICMOS 74ACT 32-D SO14	Integrated Circuit	350-22442	050
I931	ICMOS 74ACT 08 SO14	Integrated Circuit	350-24306	050

TVO-Modul Art.-Nr. 87647.050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	**SOCKETS**		
I291	IC-Fassung 32-pol.	Socket	320-23672	050
I711	IC-Fassung 44-pol.	Socket	320-24662	050
	DIODEN	**DIODES**		
10	Diode 1 N 5819	Diode	352-24307	050
D071	Diode 1 N 5819	Diode	352-24307Y03	050
	QUARZE/FILTER	**QUARTZES**		
X186	Quarz 32,768 KHz 9x3,5x3 SMD	Crystal Oscillator	385-28738030	050
X396	Quarz 14.318180 MHz VX3A Oscil.SMD	Crystal Oscillator	385-28449	050
X506	Quarz 24,576000 MHz VX3MH Oscil.SMD	Crystal Oscillator	385-28816	050
X723	Quarz 11,059200 MHz HC49U3H Low Profile	Crystal Oscillator	385-16812	050
X876	Quarz 7,680000 MHz HC49U3 Low Profile	Crystal Oscillator	385-19213	050
	KONDENSATOREN	**CAPACITORS**		
C086	Elko 1F Z 5,5V R20,0 12X6 Goldcap	Electrolyt Capacitor	360-28442	050
	SMD TEILE	**SMD PARTS**		
D080	Diode LL4148 SOD80	Diode	351-15015	050
D081	Diode ZMM C3V0 SOD80 SMD	Diode	351-22085	050
D087	Diode LL4148 SOD80	Diode	351-15015	050
D091	Diode LL4148 SOD80	Diode	351-15015	050
D592	Diode LL4148 SOD80	Diode	351-15015	050
D594	Diode LL4148 SOD80	Diode	351-15015	050
D825	Diode LL4148 SOD80	Diode	351-15015	050
D828	Diode LL4148 SOD80	Diode	351-15015	050
D835	Diode LL4148 SOD80	Diode	351-15015	050
D838	Diode LL4148 SOD80	Diode	351-15015	050
D883	Diode BAV 99 SOT23	Diode	351-18831	050
D884	Diode BAV 99 SOT23	Diode	351-18831	050
D890	Diode ZMM C3V0 SOD80 SMD	Diode	351-22085	050
D891	Diode BAV 99 SOT23	Diode	351-18831	050
D892	Diode BAV 99 SOT23	Diode	351-18831	050
Q081	Transistor BC847B SOT23	Transistor	344-14974	050
Q083	Transistor BC857B SOT23	Transistor	344-14979	050
Q533	Transistor BC847B SOT23	Transistor	344-14974	050
Q812	Transistor BC847B SOT23	Transistor	344-14974	050
Q821	Transistor BC857B SOT23	Transistor	344-14979	050
Q827	Transistor BC847B SOT23	Transistor	344-14974	050
Q831	Transistor BC857B SOT23	Transistor	344-14979	050
Q837	Transistor BC847B SOT23	Transistor	344-14974	050

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L 71	Dr. 270uH J	Choke	298-26895	
L886	Übertrager 2-fach ISDN SMD	Coil	297-28418	
L887	EMV-Drossel Array ISDN SMD	Coil	297-28419	
	INTEGR. SCHALTUNGEN	**INTEGRATED CIRCUITS**		
10	ICMOS AT 89C51 PLCC44 Microcontroller	Integrated Circuit	350-27378	
10	ICMOS 29C020# PLCC32 120N Flash	Integrated Circuit	350-28422	
I 52	3.3V 1,5A DD-P Volt. Regulator	Integrated Circuit	350-28739.030	
I 61	ICMOS M34063A SO008	Integrated Circuit	350-28429	
I101	ICMOS ELAN SC400 - 100 AC BGA292	Integrated Circuit	350-28428	
I201	ICMOS DRAM 64MB 60ns 3,3V TSOP050	Integrated Circuit	350-28427	
I206	ICMOS DRAM 64MB 60ns 3,3V TSOP050	Integrated Circuit	350-28427	
I211	ICMOS 74ALVC164245 SSOP48	Integrated Circuit	350-28426	
I231	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I236	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I241	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I251	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I256	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	
I291	ICMOS 29C020-12JC PROGR. V1.1 TVO2	Integrated Circuit	350-28422.051	
I431	ICMOS MIC2563A-1BSM SSOP28	Integrated Circuit	350-28423	061
I431	ICMOS MIC2563A-1BSM SSOP28	Integrated Circuit	350-28423	062
I446	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	061
I446	ICMOS 74ACT244 SO20	Integrated Circuit	350-24305	062
I511	ICMOS CYPERPRO 5050 QFP208	Integrated Circuit	350-28425	
I561	ICMOS SGRAM 256Kx32x2 8ns PQFP100	Integrated Circuit	350-28432	
I641	ICMOS CS4297A-JQ,CS4297A-KQ	Integrated Circuit	350-28434	
I691	ICMOS 74ABT16245 SSOP	Integrated Circuit	350-28635	
I701	ICMOS FDC37C932 QFL160	Integrated Circuit	350-28435	
I711	ICMOS 89C51 PROGR. V2.0	Integrated Circuit	350-27378.060	
I726	ICMOS 74ACT14 SO014	Integrated Circuit	350-28436	
I791	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	
I818	ICMOS 74HCT126 SO14	Integrated Circuit	350-28664	
I841	ICMOS GD75232 LGS/75C185 TI SO020	Integrated Circuit	350-28437	
I866	ICMOS PSB2115 H V 1.1 QFP64	Integrated Circuit	350-28439	
I911	ICMOS 74ACT 32-D SO14	Integrated Circuit	350-22442	
I931	ICMOS 74ACT 08 SO14	Integrated Circuit	350-24306	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	**SOCKETS**		
I291	IC-Fassung 32-pol.	Socket	320-23672	
I711	IC-Fassung 44-pol.	Socket	320-24662	
W613	Subminiatur-Buchse 15-pol.	Socket	323-28415	062
W681	Kopfhörerbuchse 3,5mm horiz.	Socket	323-24591	062
W729	Kopfhörerbuchse 2,5mm	Socket	323-27389	062
	DIODEN	**DIODES**		
10	1 N 5819	Diode	352-24307	
D 71	1 N 5819	Diode	352-24307.Y03	
	QUARZE/FILTER	**QUARTZES**		
X186	32,768 KHz SMD	Crystal Oscillator	385-28738.030	
X396	14.318180 MHz VX3A OSZIL.SMD	Crystal Oscillator	385-28449	
X506	24,576000 MHz VX3MH OSZIL.SMD	Crystal Oscillator	385-28816	
X723	11,059200 MHz HC49U3H low profile	Crystal Oscillator	385-16812	
X876	7,680000 MHz HC49U3 low profile	Crystal Oscillator	385-19213	
	KONDENSATOREN	**CAPACITORS**		
C 86	Elko 1F Z 5,5V GOLDCAP	Electrolytic Capacitor	360-28442	
	SMD TEILE	**SMD PARTS**		
D 80	0,2A 75V SOD80 LL4148	Diode	351-15015	
D 81	ZD 3V0 J 0W5 SOD-80 ZMM3	Diode	351-22085	
D 87	0,2A 75V SOD80 LL4148	Diode	351-15015	
D 91	0,2A 75V SOD80 LL4148	Diode	351-15015	
D592	0,2A 75V SOD80 LL4148	Diode	351-15015	
D594	0,2A 75V SOD80 LL4148	Diode	351-15015	
D825	0,2A 75V SOD80 LL4148	Diode	351-15015	
D828	0,2A 75V SOD80 LL4148	Diode	351-15015	
D835	0,2A 75V SOD80 LL4148	Diode	351-15015	
D838	0,2A 75V SOD80 LL4148	Diode	351-15015	
D883	BAV 99 SOT23	Diode	351-18831	
D884	BAV 99 SOT23	Diode	351-18831	
D890	ZD 3V0 J 0W5 SOD-80 ZMM3	Diode	351-22085	
D891	BAV 99 SOT23	Diode	351-18831	
D892	BAV 99 SOT23	Diode	351-18831	
Q 81	BC847B SOT23	Transistor	344-14974	
Q 83	BC857B SOT23	Transistor	344-14979	
Q533	BC847B SOT23	Transistor	344-14974	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q812	BC847B SOT23	Transistor	344-14974	
Q821	BC857B SOT23	Transistor	344-14979	
Q827	BC847B SOT23	Transistor	344-14974	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	SMD TEILE	**SMD PARTS**		
Q831	BC857B SOT23	Transistor	344-14979	
Q837	BC847B SOT23	Transistor	344-14974	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
830	Frequenzweiche Q2500 ACO81/ARC84/CAL84	P.C.B	396-85729.077	
U2500	Basic B. kpl. Q25H 32"/WSRF/120V/M-EPAS	P.C.B	396-88175.056	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (THOS)	P.C.B	396-88319.052	
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
104	Schutzstreifen	Protective Packing	253-84666.025	
600	Faltschachtel	Packing Case	245-87749.002	
610	Packschalen-Satz 32" Aconda	Cushion-Set	252-87742.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
	KNÖPFE	**BUTTONS**		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
	GEHÄUSETEILE	**CABINET MOUNTING**		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
103	Führungsschiene	Guide	553-87855.001	
105	Gehäusefufl farblos	Foot	783-82251.105	
106	Stütze	Support	551-87854.001	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	**CABINET MOUNTING**		
330	Ölsilikondämpfer	Gear Wheel	616-28668	
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	
710	32Z WSRF W76LTL350X97 (U)	Picture Tube	345-29484	
G100	Gehäuse Light Blue	Cabinet	750-87747.109	I62
G100	Gehäuse Light Green	Cabinet	750-87747.110	G62
G100	Gehäuse Light Silver	Cabinet	750-87747.111	B62
G110	Rückwand platin	Backcover	775-87748.109	
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand platin	Mask	703-87756.109	
G310	Klappe kpl. Light Blue	Cover Plate	706-87745.107	I62
G310	Klappe kpl. Light Green	Cover Plate	706-87745.108	G62
G310	Klappe kpl. Light Silver	Cover Plate	706-87745.109	B62
G311	Scharnier für Klappe	Hinge	573-87744.101	
G350	Ziergitter Light Blue	Speaker Grille	708-87746.113	I62
G350	Ziergitter Light Green	Speaker Grille	708-87746.114	G62
G350	Ziergitter Light Silver	Speaker Grille	708-87746.115	B62
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
800	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	
810	Lautspr. 4 Ohm 20W HT	Loudspeaker	272-86411	
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
830	Frequenzweiche kpl. Q2000	P.C.B	396-85729.051	
U2500	Basic Board kpl. Q25H 29"/RF/136V/M-EPAS	P.C.B	396-88175.050	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.055	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
211	Kabelbinder 290x4,8mm	Cable Binding	530-18263	
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
600	Faltschachtel	Packing Case	245-87908.002	
610	Packschalen-Satz 29" Aconda	Cushion-Set	252-87907.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
	KNÖPFE	**BUTTONS**		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
	GEHÄUSETEILE	**CABINET MOUNTING**		
101	Schraube 6-Kant EJOT 7,0x34 / K70x34	Screw	440-28982	
103	Führungsschiene	Guide	553-87855.001	
105	Gehäusefufl schwarz	Foot	783-88016.002	
106	Stütze	Support	551-87854.011	
110	Kabelhalter schwarz	Cable Binding	530-87903.002	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
115	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
200	Distanzstück für Bildrohrbefestigung	Clutch Piece	503-17983	
230	Halter/Entmag.	Holder	602-87243.001	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	
710	29Z A68ERF031X044	Picture Tube	345-28884	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	**CABINET MOUNTING**		
G100	Gehäuse hgl.-schwarz vorm.	Cabinet	750-87909.052	L62
G100	Gehäuse Stratos-Metallic vorm.	Cabinet	750-87909.056	H62
G110	Rückwand	Backcover	775-87911.002	
G111	Zwischenst¸ck schwarz	Cover	568-85727.102	
G112	Abdeckung R¸ckwand	Mask	703-87912.002	
G350	Abdeckung Lautsprecher rechts	Mask	703-87913.012	
G351	Abdeckung Lautsprecher links	Mask	703-87913.002	
H1995	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
800	Lautspr.10 Ohm 11W Tiefton	Loudspeaker	272-85892	
810	Lautspr. 8 Ohm 11W	Loudspeaker	272-86074	
L6001	Entmagn.-Spule 29" 4:3	Coil	297-87882.006	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
305	Clamper	Cable Binding	530-21237	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

Aconda 9581ZW Art.-Nr. 61404.63

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
830	Lpl. Frequenzweiche kpl.	P.C.B	396-85729.063	R63
U2500	Basic B. kpl. Q25H 32"/WSRF/136V/M-EPAS	P.C.B	396-88175.055	R63
U2501	Signal Board kpl. Q25H NICAM/PIP/AC3	P.C.B	396-88176.056	R63
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	R63
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	R63
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I Aconda 9581 Q2500	Operating Instructions	233-29828	R63
502	BAN -NL-F Aconda 9581 Q2500	Operating Instructions	233-29828.010	R63
503	BAN -GB-E Aconda 9581 Q2500	Operating Instructions	233-29828.020	R63
505	BAN -D-I-F-NL-GB-E- Dolby Digital Q25	Operating Instructions	233-29742	R63
540	Service Kurzanleitung Q2500	Service Manual	230-29277	R63
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
700	IR-Fernbedienung Control 10 arktis	Transmitter	263-87000.071	R63
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	R63
H881	Noppenstreifen selbstklebend	Felt Strip	414-29337	R63
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	R63
104	Schutzstreifen	Protective Packing	253-84666.025	R63
600	Faltschachtel	Packing Case	245-87749.002	R63
610	Packschalen-Satz 32" Aconda	Cushion-Set	252-87742.050	R63
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	R63
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	R63
	KNÖPFE	**BUTTONS**		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	R63
350	Knopf/Netzschalter schwarz	Button	682-86697.002	R63
	GEHÄUSETEILE	**CABINET MOUNTING**		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	R63
103	Führungsschiene	Guide	553-87855.001	R63
105	Gehäusefufl farblos	Foot	783-82251.105	R63
106	Stütze	Support	551-87854.001	R63
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	R63
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	R63
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	R63
200	Distanzstück	Clutch Piece	503-24754	R63
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	R63
230	Halter/Entmag.	Holder	602-87243.001	R63

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	**CABINET MOUNTING**		
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	R63
311	Magnet D 8x4	Magnet	303-28596	R63
330	Ölsilikondämpfer	Gear Wheel	616-28668	R63
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	R63
710	32Z W76ERF042X044	Picture Tube	345-29618	R63
G100	Gehäuse Stratos-Metallic	Cabinet	750-87747.028	R63
G110	Rückwand Stratos-Metallic	Backcover	775-87748.104	R63
G111	Zwischenstück schwarz	Cover	568-85727.102	R63
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	R63
G311	Scharnier für Klappe	Hinge	573-87744.101	R63
G350	Ziergitter Stratos-Metallic	Speaker Grille	708-87746.112	R63
H1996	Abdeckung SCART m. IR-Link vorm. Q2500	Mask	703-87728.051	R63
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
800	Lautspr. Z=4 Ohm 20W TT	Loudspeaker	272-87846	R63
810	Lautspr. 4 Ohm 20W HT	Loudspeaker	272-86411	R63
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	R63
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	R63
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	R63
H475	Clamper	Cable Binding	530-20809	R63
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	R63

Aconda 9381ZW Art.-Nr. 61405.52/62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
830	Lpl. Frequenzweiche kpl.	P.C.B	396-85729.063	H62
830	Lpl. Frequenzweiche kpl.	P.C.B	396-85729.063	L62
830	Frequenzweiche Q2500 ACO81/ARC84/CAL84	P.C.B	396-85729.077	H52
830	Frequenzweiche Q2500 ACO81/ARC84/CAL84	P.C.B	396-85729.077	L52
U2500	Basic B. kpl. Q25H 32"/WSRF/136V/M-EPAS	P.C.B	396-88175.055	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	L62
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.055	H52
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.055	L52
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	H62
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	H62
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	L62
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	H62
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	L62
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
104	Schutzstreifen	Protective Packing	253-84666.025	
600	Faltschachtel	Packing Case	245-87749.002	
610	Packschalen-Satz 32" Aconda	Cushion-Set	252-87742.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
	KNÖPFE	**BUTTONS**		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
	GEHÄUSETEILE	**CABINET MOUNTING**		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
103	Führungsschiene	Guide	553-87855.001	
105	Gehäusefufl farblos	Foot	783-82251.105	
106	Stütze	Support	551-87854.001	

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Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHäUSETEILE	**CABINET MOUNTING**		
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	
330	Ölsilikondämpfer	Gear Wheel	616-28668	
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	
710	32Z W76ERF042X044	Picture Tube	345-29618	
G100	Gehäuse hgl.-schwarz	Cabinet	750-87747.102	L52
G100	Gehäuse hgl.-schwarz	Cabinet	750-87747.102	L62
G100	Gehäuse Stratos-Metallic	Cabinet	750-87747.106	H52
G100	Gehäuse Stratos-Metallic	Cabinet	750-87747.106	H62
G110	Rückwand	Backcover	775-87748.102	
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand	Mask	703-87756.102	
G310	Klappe kpl. hgl.-schwarz	Cover Plate	706-87745.101	L52
G310	Klappe kpl. hgl.-schwarz	Cover Plate	706-87745.101	L62
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	H52
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	H62
G311	Scharnier für Klappe	Hinge	573-87744.101	
G350	Ziergitter	Speaker Grille	708-87746.102	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
800	Lautspr. Z=4 Ohm 20W TT	Loudspeaker	272-87846	H62
800	Lautspr. Z=4 Ohm 20W TT	Loudspeaker	272-87846	L62
800	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	H52
800	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	L52
810	Lautspr. 4 Ohm 20W HT	Loudspeaker	272-86411	
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
305	Clamper	Cable Binding	530-21237	H62
305	Clamper	Cable Binding	530-21237	L62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	
H475	Clamper	Cable Binding	530-20809	H52
H475	Clamper	Cable Binding	530-20809	H62
H8003	Silikon-Glasseidenschlauch 14,0x0,7	Insulating Tube	184-29885	H52
H8003	Silikon-Glasseidenschlauch 14,0x0,7	Insulating Tube	184-29885	L52

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

Aconda 93102ZW Art.-Nr. 61406.63

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
U2500	Basic B. kpl. Q25H 40"/WSSF/136V/M-EPAS	P.C.B	396-88175.052	
U2501	Signal Board kpl. Q25H NICAM/PIP/AC3	P.C.B	396-88176.056	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 ACO 93102	P.C.B	396-88319.051	
U8211	Modul-Bedienteil Q2500 Aconda	P.C.B	396-88226.050	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I ACO Q2500	Operating Instructions	233-29377	
502	BAN -NL-F ACO Q2500	Operating Instructions	233-29377.010	
503	BAN -GB-E ACO Q2500	Operating Instructions	233-29377.020	
505	BAN -D-I-F-NL-GB-E- Dolby Digital Q25	Operating Instructions	233-29742	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control 150 TV arktis	Transmitter	263-87000.060	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
102	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
600	Schachtel Aconda 93102	Packing Case	245-88322.002	
601	Flachpalette (Einweg) Aconda 93102	Wood Foot Rack	259-88483.001	
602	PP-Band 15,5x0,55mm sw-gepr.	Accessories	256-18061	
610	Verpackungsformteil Aconda 93102	Cushion-Set	252-88323.050	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
	KNÖPFE	**BUTTONS**		
320	Tastenset für Servicefunktionen schwarz	Button	682-87685.121	
350	Knopf/Netzschalter schwarz	Button	682-86697.002	
	GEHÄUSETEILE	**CABINET MOUNTING**		
101	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
103	Führungsschiene	Guide	553-87855.021	
104	Filzstreifen für Rückwand	Felt Strip	414-20742	
105	Gehäusefufl schwarz	Foot	783-88016.022	
106	Stütze	Support	551-87854.011	
108	Stopfen f. Lautsprecher-Box Aconda 93102	Stopper	506-29343	
109	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
112	Filzzuschnitt 30x5x1 für RW	Felt Strip	414-27413	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
114	Filzstreifen 0,5x5x340mm	Felt Strip	414-28825	
115	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	

Aconda 93102ZW Art.-Nr. 61406.63

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	**CABINET MOUNTING**		
121	Schraube K5,0x20,0 Torx T25 WN5451	Screw	440-29371	
122	Zugentlastung f. Netzkabel Aconda 93102	Cable Binding	530-29355	
123	Metallplatte Aconda 93102	Spring Contact	309-29360	
301	EJOT-PT-Schraube KL11,5x40	Screw	440-29047	
311	Magnet D 8x4	Magnet	303-28596	
330	Ölsilikondämpfer	Gear Wheel	616-28668	
331	Schraube EJOT-PT 3,0x8 KB30x8	Screw	440-23640	
710	40Z W97AJG14X08 (38V)	Picture Tube	345-28988	
G100	Gehäuse Stratos-Metallic Aconda 93102	Cabinet	750-88237.006	H63
G100	Gehäuse hgl.-schwarz Aconda 93102	Cabinet	750-88237.012	L63
G110	Rückwand graphit Aconda 93102	Backcover	775-88238.004	
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand graphit Aconda 93102	Mask	703-88239.004	
G310	Klappe kpl. hgl.-schwarz	Cover Plate	706-87745.101	L63
G310	Klappe kpl. Stratos-Metallic	Cover Plate	706-87745.106	H63
G311	Scharnier für Klappe Aconda 93102	Hinge	573-88241.001	
G350	Schallwand Aconda 93102 vorm. Q2500	Front Cover	776-88242.051	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L6001	Entmagn.-Spule 38"	Coil	297-87882.007	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
305	Clamper	Cable Binding	530-21237	
306	Kabelhalter auf Kühlblech NF	Cable Binding	530-20935	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

Articos 32 Art.-Nr. 61450.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
300	Stand-by Netzteil kpl. Articos	P.C.B	396-88117.050	
U2500	Basic B. kpl. Q2500 32"/WSRF/136V/M-EPAS	P.C.B	396-88175.055	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
633	BAN -D-I Articos 32 / Aconda 9581 Q2500	Operating Instructions	233-29792	
634	BAN -NL-F Articos 32 / Aconda 9581 Q2500	Operating Instructions	233-29792.010	
635	BAN -GB-E Articos 32 / Aconda 9581 Q2500	Operating Instructions	233-29792.020	
636	Service Kurzanleitung Q2500	Service Manual	230-29277	
639	Rückantwortkarte LOEWE 1 D-I-GB-F-E-NL	Indicating Sheet	240-28786.001	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
602	Filterscheibe Articos	Window	666-88188.002	
642	IR-Fernbedienung Control 10 arktis	Transmitter	263-87000.071	
644	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
645	Reinigungsmittel 100ml	Detergent	209-29719	
646	Reinigungsset - Tuch+Handschuhe	Protective Covering	254-29720	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
600	Faltschachtel Articos 32	Packing Case	245-88184.002	
610	Packschalen-Satz Articos 32	Cushion-Set	252-88192.050	
611	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
612	Schutzstreifen	Protective Packing	253-84666.025	
630	Verpackungskarton für BAN+FB Articos 32	Packing Case	245-88422.002	
631	Einlage f. Verp.-Beipack	Accessories	256-86784.001	
643	PE-Schutzeinlage 265x335x1	Protective Packing	253-26221	
	VERBINDUNGSLEITUNG	**CONNECTING CABLES**		
N8003	Netzkabel Dr. 2250mm 0,75 SW JST	Power Cord	170-29158.001	
	GEHÄUSETEILE	**CABINET MOUNTING**		
100	Fufl Aluminium Articos	Foot	783-88215.002	
101	Schraube K5,0x20,0 Torx T25 WN5451	Screw	440-29371	
102	Formstanzteil 38x20mm	Damping Rubber	406-29728	
103	Schallwand Articos vormontiert	Front Cover	776-88195.050	
106	Stütze	Support	551-87854.031	
109	Filzstreifen für Rückwand	Felt Strip	414-20742	
110	Kabelhalter schwarz	Cable Binding	530-87903.002	
112	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	

Articos 32 Art.-Nr. 61450.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	**CABINET MOUNTING**		
114	Filzstreifen	Felt Strip	414-25204	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
603	Filzstreifen 5x1,2x385,5mm	Felt Strip	414-29740.001	
604	Filzstreifen 5x1,2x692,5mm	Felt Strip	414-29740.002	
710	32Z W76ERF042X044	Picture Tube	345-29618	
G100	Gehäuse unlackiert Articos	Cabinet	750-88191.001	
G101	Frontblende basalt-hgl. Articos vorm.	Cabinet	757-88189.055	M62
G101	Frontblende platin Articos vormontiert	Cabinet	757-88189.059	A62
G102	Bedienteilträger basalt-hgl. Arti. vorm.	Supporter	541-88171.055	M62
G102	Bedienteilträger platin Articos vorm.	Supporter	541-88171.059	A62
G110	Rückwand platin Articos	Backcover	775-88194.009	A62
G110	Rückwand basalt-hgl. Articos	Backcover	775-88194.015	M62
G111	Zwischenstück schwarz	Cover	568-85727.102	
G112	Abdeckung Rückwand platin Articos	Mask	703-88187.009	A62
G112	Abdeckung Rückwand basalt-hgl. Articos	Mask	703-88187.015	M62
H1996	Abdeckung SCART m. IR-Link vorm. Articos	Mask	703-87728.051	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Korrekturspule m. Rotationsmodul Q25	Coil	297-29299	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

Xelos 5981TV-M Art.-Nr. 61465.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
970	EBS VGA Q2500	Scaffolding Access.	291-87808.006	
U2500	Basic B. kpl. Q25H 32"/WSSF/136V/M-EPAS	P.C.B	396-88175.054	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U8211	Modul-Bedienteil Q25 Xelos 61/70/81	P.C.B	396-88225.053	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I Xelos TV-M/O Q2500	Operating Instructions	233-29214	
502	BAN -NL-F Xelos TV-M/O Q2500	Operating Instructions	233-29214.010	
503	BAN -GB-E Xelos TV-M/O Q2500	Operating Instructions	233-29214.020	
506	BAN Control für Set-TOP-Boxen	Indicating Sheet	240-28833	
507	Hinweisblatt Noppenstreifen	Indicating Sheet	240-29994	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control MM/D-Box arktis	Transmitter	263-87000.091	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
600	Verpackungskarton	Packing Case	245-87406.002	
610	Packschalen-Satz 32" Xelos	Cushion-Set	252-87407.050	
611	Schutzstreifen 1600x1250 mm	Protective Packing	253-84666.022	
612	Schutzstreifen	Protective Packing	253-84666.025	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
	VERBINDUNGSLEITUNG	**CONNECTING CABLES**		
N8003	Netzkabel Dr. 2250mm 0,75 SW JST	Power Cord	170-29158.001	
	KNÖPFE	**BUTTONS**		
310	Knopf/Netzschalter	Button	682-87103.001	
G330	Knopf/Taster grau	Button	682-87138.001	A62
G330	Knopf/Taster schwarz	Button	682-87138.002	L62
	GEHÄUSETEILE	**CABINET MOUNTING**		
112	Schraube 40x20 Torx WN1451	Screw	440-25382	
200	Distanzstück	Clutch Piece	503-24754	
201	EJOT-PT-Schraube 10,0x45 K100x45	Screw	440-19149	
230	Halter/Entmag.	Holder	602-87243.001	
710	32Z W76ESF031X44	Picture Tube	345-26377	
G100	32" Gehäuse schwarz MM vorm. Q2500	Cabinet	750-87399.058	L62
G100	32" Gehäuse platin MM vorm. Q2500	Cabinet	750-87399.059	A62

Xelos 5981TV-M Art.-Nr. 61465.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHƒUSETEILE	**CABINET MOUNTING**		
G101	Zwischenstück natur	Cover	568-85727.101	A62
G101	Zwischenstück schwarz	Cover	568-85727.102	L62
G110	Rückwand platin 32"	Backcover	775-87401.019	A62
G110	Rückwand schwarz 32"	Backcover	775-87401.112	L62
G111	Zwischenstück natur	Cover	568-85727.101	A62
G111	Zwischenstück schwarz	Cover	568-85727.102	L62
G112	Abdeckung / Rückwand schwarz	Mask	703-87403.002	L62
G112	Abdeckung/Rückwand platin	Mask	703-87403.009	A62
G331	Fenster	Window	666-87139.001	
H1995	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L6001	Entmagn.-Spule 32" 16:9/ 33" 4:3	Coil	297-87882.001	
L6002	Spule Rotation m. Lpl. Q25 JST	Coil	297-29299	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
192	Clamper	Cable Binding	530-21237	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE 87399.058/059	**CABINET MOUNTING 87399.058/059**		
10	FFS-Gehäuse mit Ziergitter schwarz 32"	Cabinet	750-87399.032	058
10	Gehäuse mit Ziergitter platin 32"	Cabinet	750-87399039	059
40	Träger/Bedienung arktis	Supporter	541-87102.001	059
40	Träger/Bedienung schwarz	Supporter	541-87102.002	058
50	Abdeckklappe für Lautsprecher am Geh. unten	Mask	703-84577.101	
70	Haltewinkel	Angle	596-87404.001	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
20	Lautsprecher 4 Ohm 20W TT (JST)	Loudspeaker	272-88439	

Xelos 5970TV-M Art.-Nr. 61466.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	BAUGRUPPEN	**UNITS**		
970	EBS VGA Q2500	Scaffolding Access.	291-87808.006	
U2500	Basic B. kpl. Q25H 28"/WSSF/136V/M-EPAS	P.C.B	396-88175.053	
U2501	Signal Board kpl. Q25H NICAM/PIP	P.C.B	396-88176.053	
U3371	Bildrohrpl./SVM kpl. Q2500 16:9 (JST)	P.C.B	396-87832.062	
U8211	Modul-Bedienteil Q25 Xelos 61/70/81	P.C.B	396-88225.053	
	DRUCKSACHEN	**OPERATING INSTRUCTIONS**		
500	BAN -D-I Xelos TV-M/O Q2500	Operating Instructions	233-29214	
502	BAN -NL-F Xelos TV-M/O Q2500	Operating Instructions	233-29214.010	
503	BAN -GB-E Xelos TV-M/O Q2500	Operating Instructions	233-29214.020	
506	BAN Control für SET-TOP-Boxen	Indicating Sheet	240-28833	
507	Hinweisblatt Noppenstreifen	Indicating Sheet	240-29994	
540	Service Kurzanleitung Q2500	Service Manual	230-29277	
	GERÄTEBEIPACK	**SET SUPPLEMENT**		
A0640	Mikrozelle 1,5V Alkali-Mangan	Accumulator	280-13411	
U9111	IR-Fernbedienung Control MM/D-Box arktis	Transmitter	263-87000.091	
	VERPACKUNGSMATERIAL	**PACKING MATERIAL**		
600	Verpackungskarton	Packing Case	245-87106.002	
610	Packschalen-Satz 28" Xelos	Cushion-Set	252-87107.050	
611	Schutzstreifen	Protective Packing	253-84666.025	
J0501	Klarsichtbeutel 240x320 bedruckt	Protective Packing	253-16668	
J0701	Schutzstreifen 350x190 mm(IR-G.)	Protective Packing	253-84666.004	
	VERBINDUNGSLEITUNG	**CONNECTING CABLES**		
N8003	Netzkabel Dr. 2250mm 0,75 SW JST	Power Cord	170-29158.001	
	KNÖPFE	**BUTTONS**		
310	Knopf/Netzschalter	Button	682-87103.001	
G330	Knopf/Taster grau	Button	682-87138.001	A62
G330	Knopf/Taster schwarz	Button	682-87138.002	L62
	GEHÄUSETEILE	**CABINET MOUNTING**		
100	Klebestreifen für Rückwand	Foam Plastics Ledge	411-20926	
110	Filzstreifen	Felt Strip	414-25204	
112	Schraube 40x20 Torx WN1451	Screw	440-25382	
113	Schraube K4,0x14,0 Torx sw-vzkt.	Screw	440-27723	
200	Distanzstück für Bildrohrbefestigung	Clutch Piece	503-17983	
201	Schraube 7x40 vzkt. für Bildrohrbefestigung	Screw	440-18058	
230	Halter/Entmag.	Holder	602-87243.001	
709	Konvergenz-Minipol	Deflection Unit	278-26996	

Xelos 5970TV-M Art.-Nr. 61466.62

Pos.Nr. Item N°.	Bestell-Bezeichnung	Description	Bestell-Nr. List Part N°.	Var. Var.
	GEHÄUSETEILE	**CABINET MOUNTING**		
G100	564 28" Gehäuse sw. MM vorm.	Cabinet	750-87099.052	L62
G100	28" Gehäuse platin MM vorm.	Cabinet	750-87099.055	A62
G101	Zwischenstück natur	Cover	568-85727.101	A62
G101	Zwischenstück schwarz	Cover	568-85727.102	L62
G110	Rückwand platin 28"	Backcover	775-87101.019	A62
G110	Rückwand schwarz 28"	Backcover	775-87101.112	L62
G111	Zwischenstück natur	Cover	568-85727.101	A62
G111	Zwischenstück schwarz	Cover	568-85727.102	L62
G112	Abdeckung/Rückwand schwarz	Mask	703-87105.002	L62
G112	Abdeckung/Rückwand platin	Mask	703-87105.009	A62
G331	Fenster	Window	666-87139.001	
G350	Frontabdeckung schw. Lautspr.+Bedienteil	Mask	703-87104.002	L62
G350	Frontabdeckung platin Lautspr.+Bedienteil	Mask	703-87104.009	A62
H1996	Abdeckung SCART Q25M/H	Mask	703-87728.001	
V3001	28Z W66ESF032X44	Picture Tube	345-27377	
	SPULEN/LAUTSPRECHER	**COILS,SPEAKERS**		
L6001	Entmagn.-Spule 28/29" 4:3, 28" 16:9	Coil	297-87882.003	
	ALLGEM. MECHAN. TEILE	**COMMON MECHANICAL PARTS**		
192	Clamper	Cable Binding	530-21237	
	BUCHSEN/FASSUNGEN	**SOCKETS**		
N470	Adapter Lautsprecheranschlufl Q2500	Plug	321-29382	

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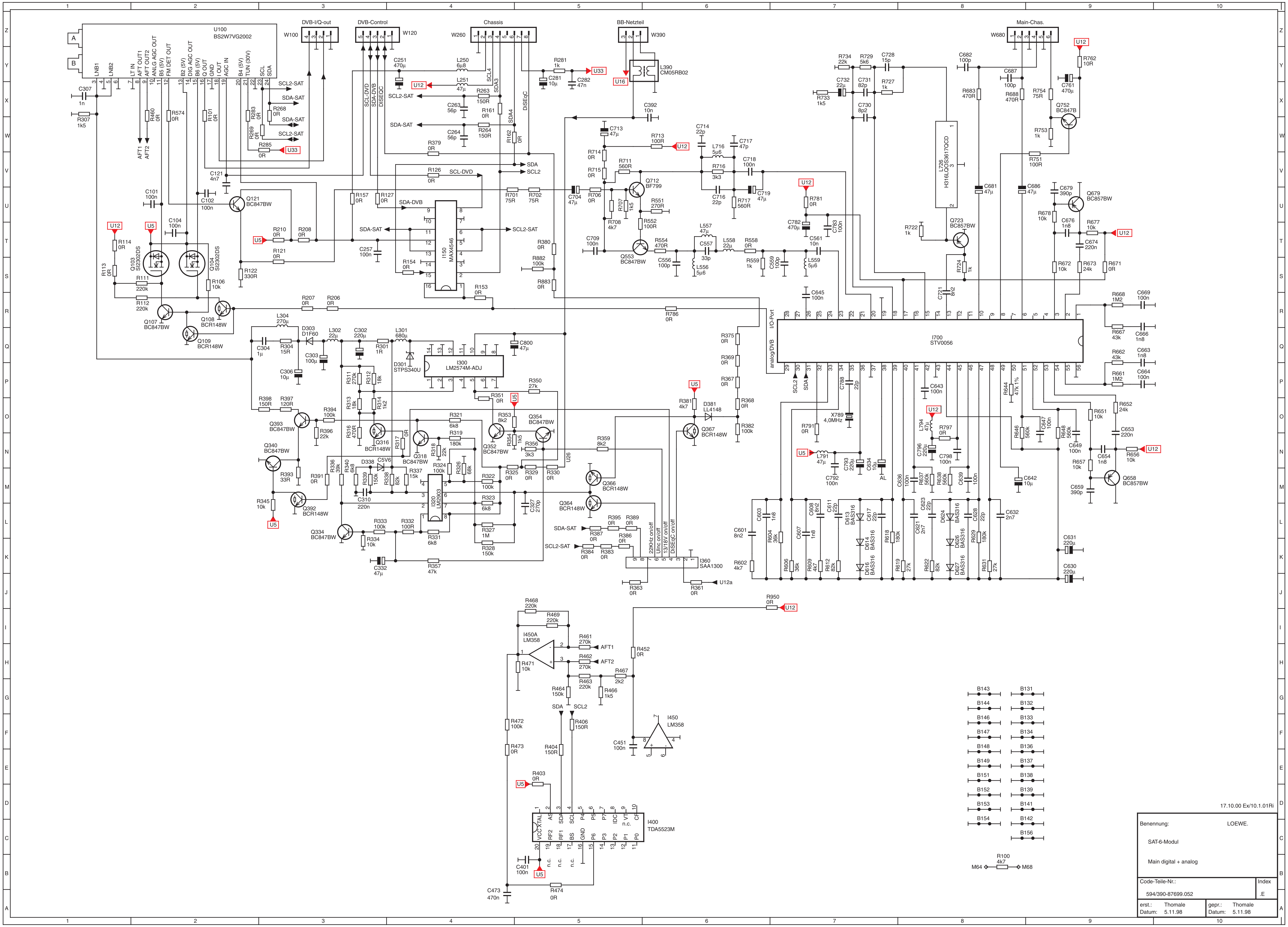
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BAS316
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LM358
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VCCXTAL
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17.10.00 Ex/10.1.01Ri

Benennung: LOEWE.

SAT-6-Modul

Main digital + analog

Code-Teile-Nr.: 594/390-87699.052

Index .E

erst.: Thomale Datum: 5.11.98

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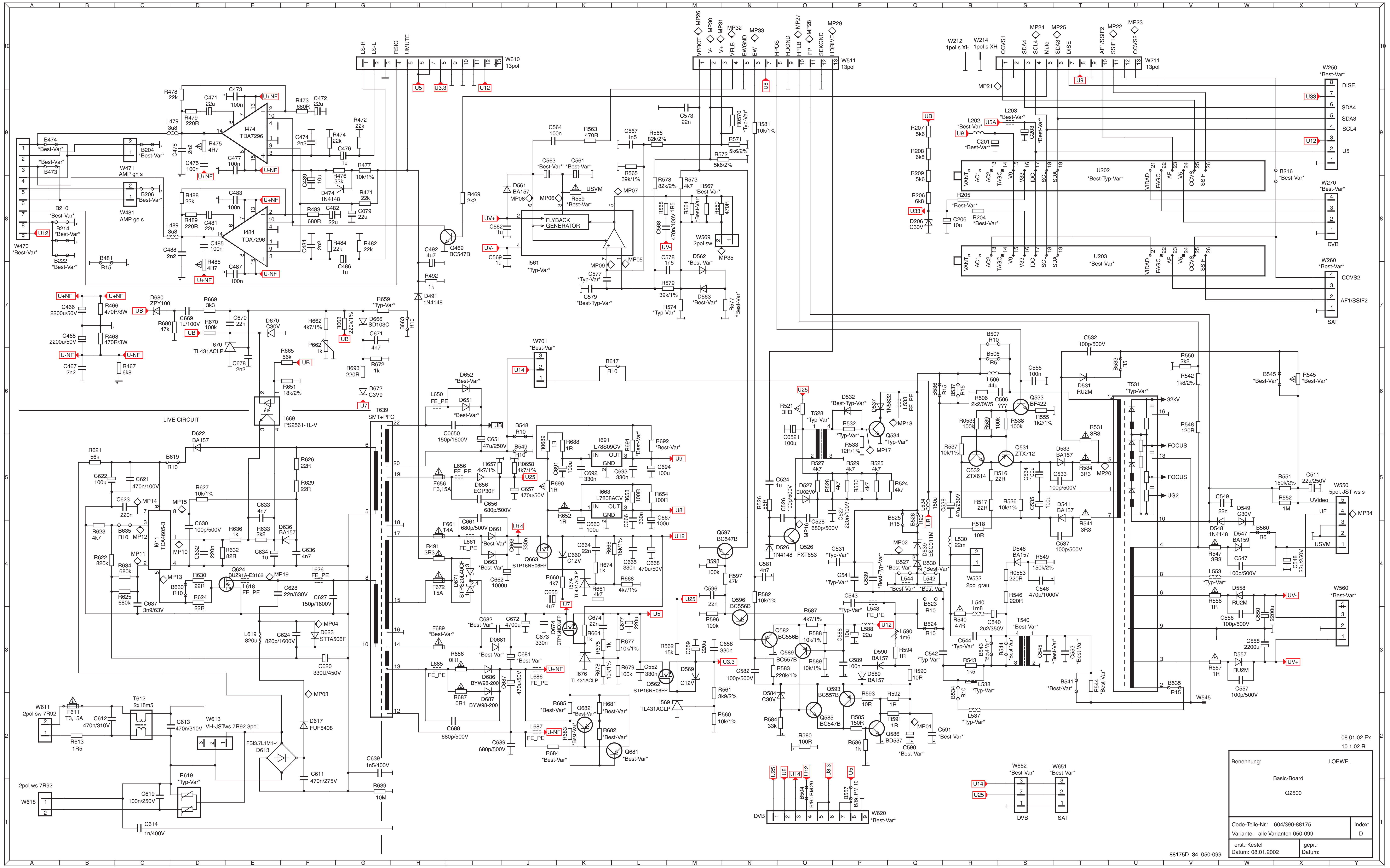
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W511 13pol
W211 13pol
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W481 AMP ge s
FLYBACK GENERATOR
I561 *Typ-Var*
W569 2pol sw
LIVE CIRCUIT
I669 PS2561-1L-V
T639 SMT+PFC
I611 TDA4605-3
I691 L78S09CV
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U202 *Best-Typ-Var*
U203 *Best-Var*
W250 *Best-Var*
W270 *Best-Var*
W260 *Best-Var*
W550 5pol. JST ws s
W560 *Best-Var*
T531 *Typ-Var*
T540 *Best-Var*
T526 *Typ-Var*
T612 2x18m5
W611 2pol sw 7R92
W613 VH-JSTws 7R92 3pol
W618 2pol ws 7R92
W620 *Best-Var*
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W532 2pol grau
DVB
SAT
32kV
FOCUS
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UG2
UVideo
UF
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CCVS2
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DISE
SDA4
SDA3
SCL4
U5
08.01.02 Ex
10.1.02 Ri
88175D_34_050-099

Benennung: LOEWE.

Basic-Board

Q2500

Code-Teile-Nr.: 604/390-88175

Variante: alle Varianten 050-099

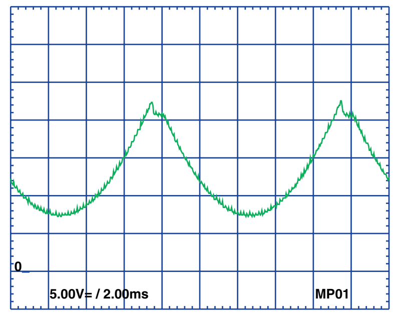
Index: D

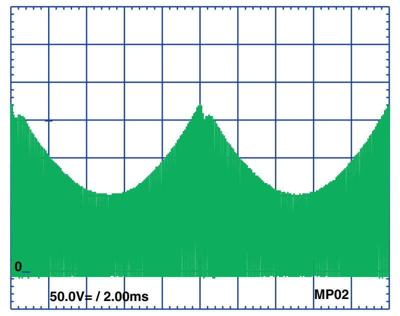
erst.: Kestel

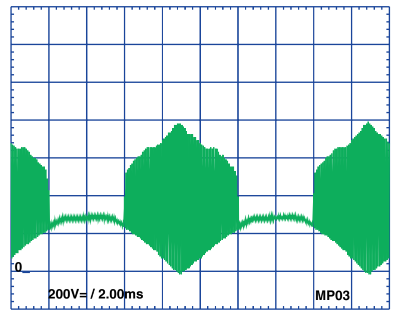
Datum: 08.01.2002

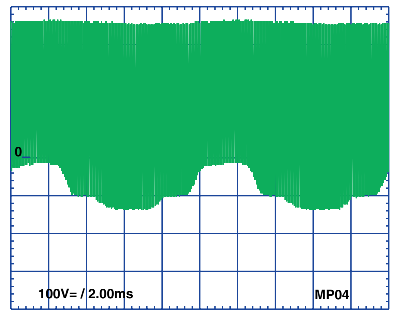
gepr.:

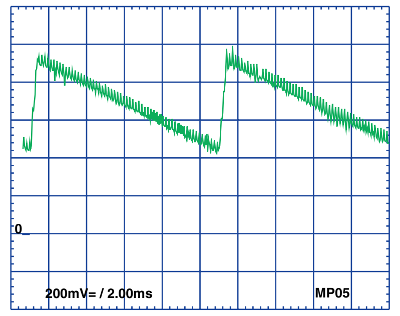
Datum:

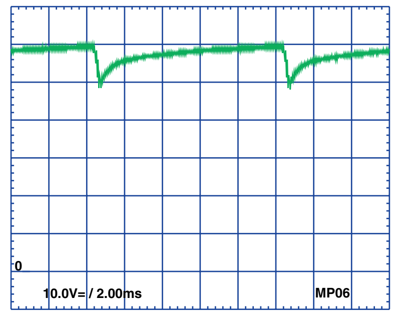


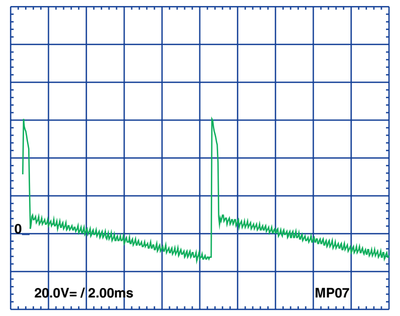


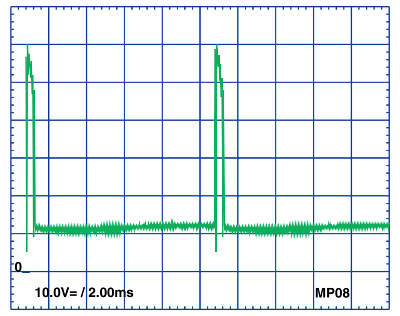


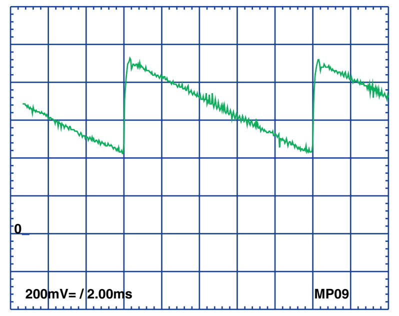


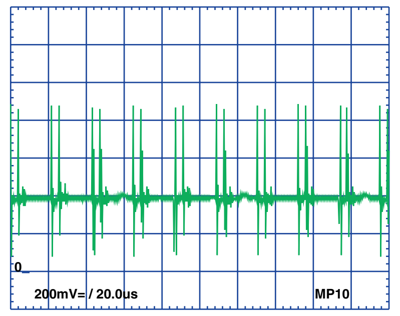


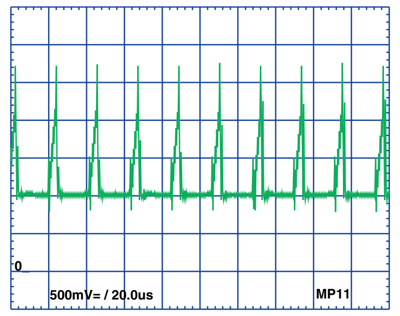


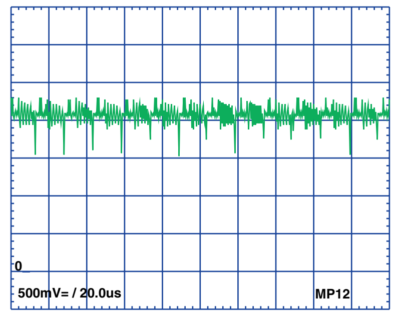


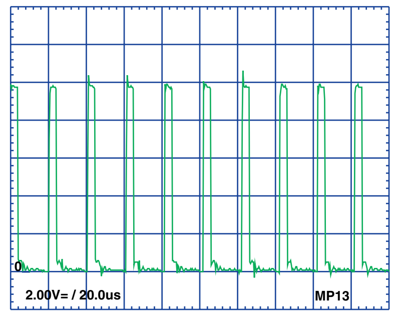


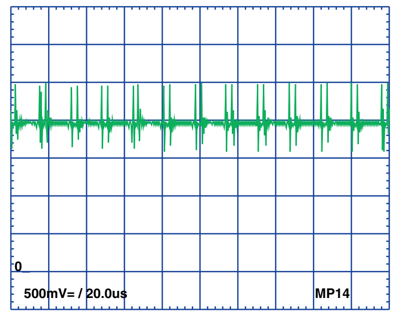


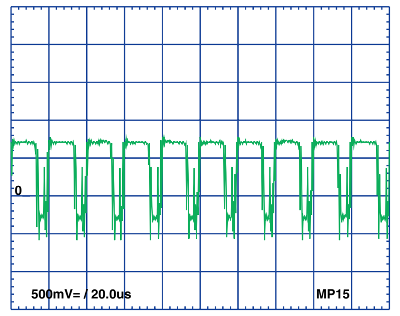


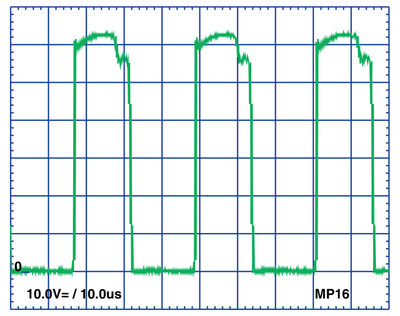


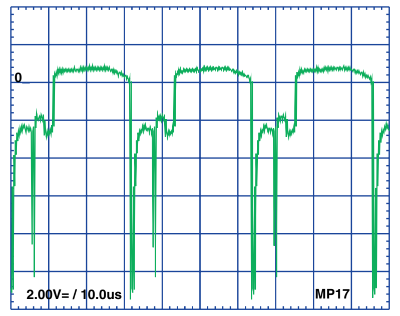


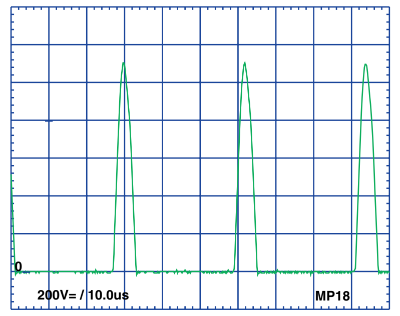


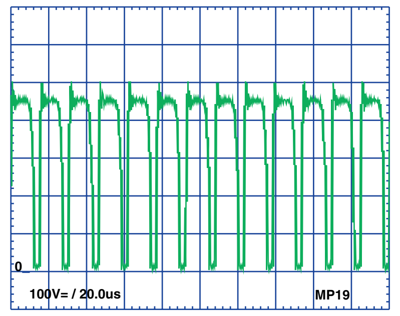


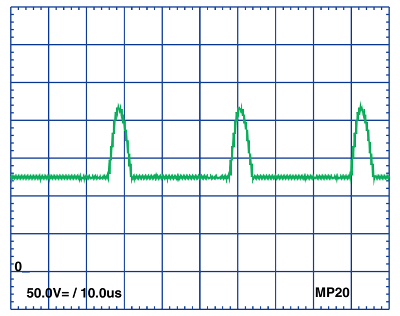


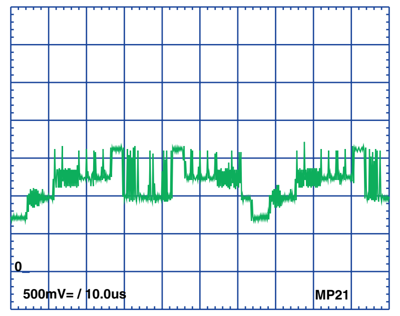


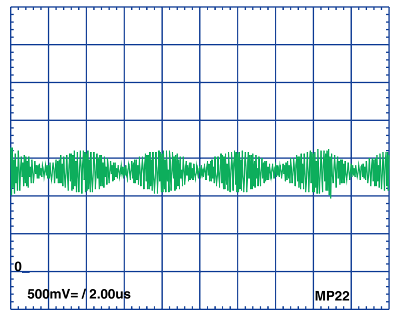


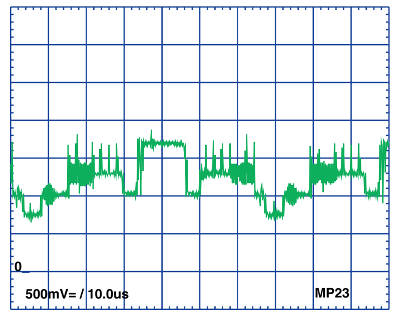


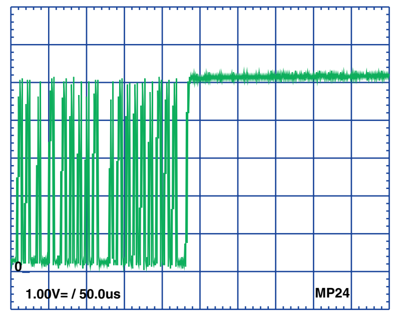


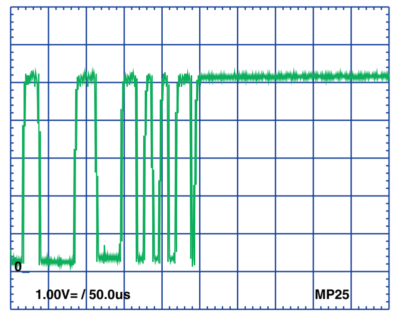


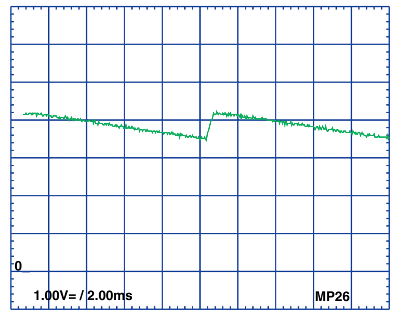


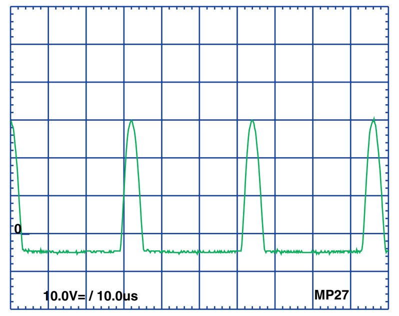


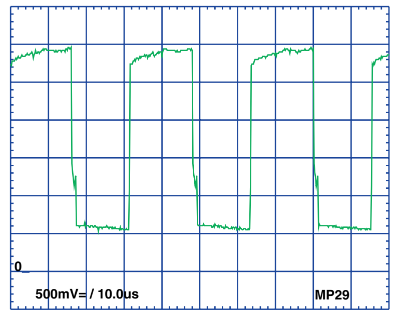


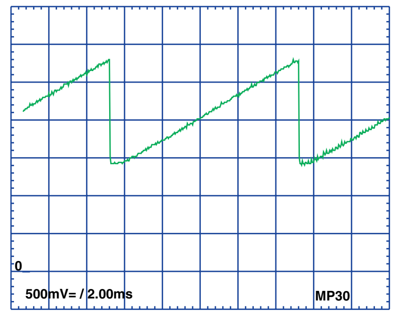


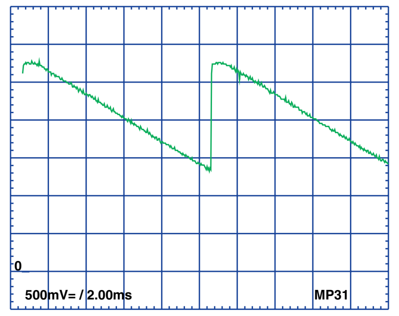


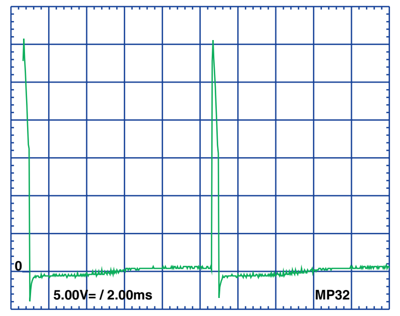


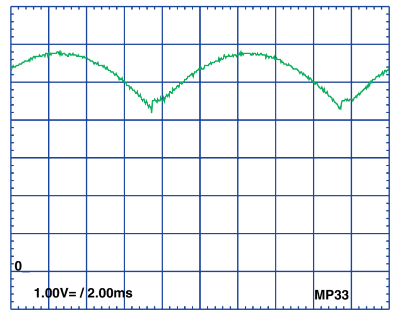


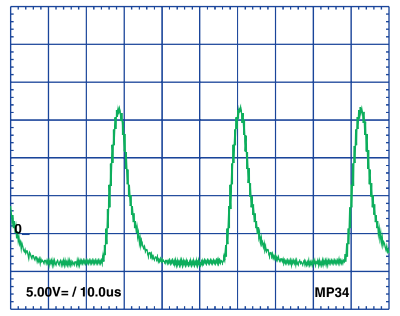


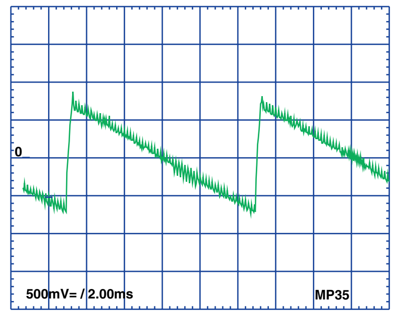


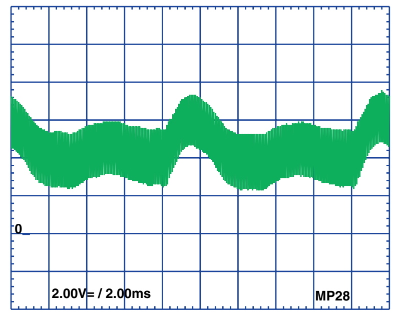


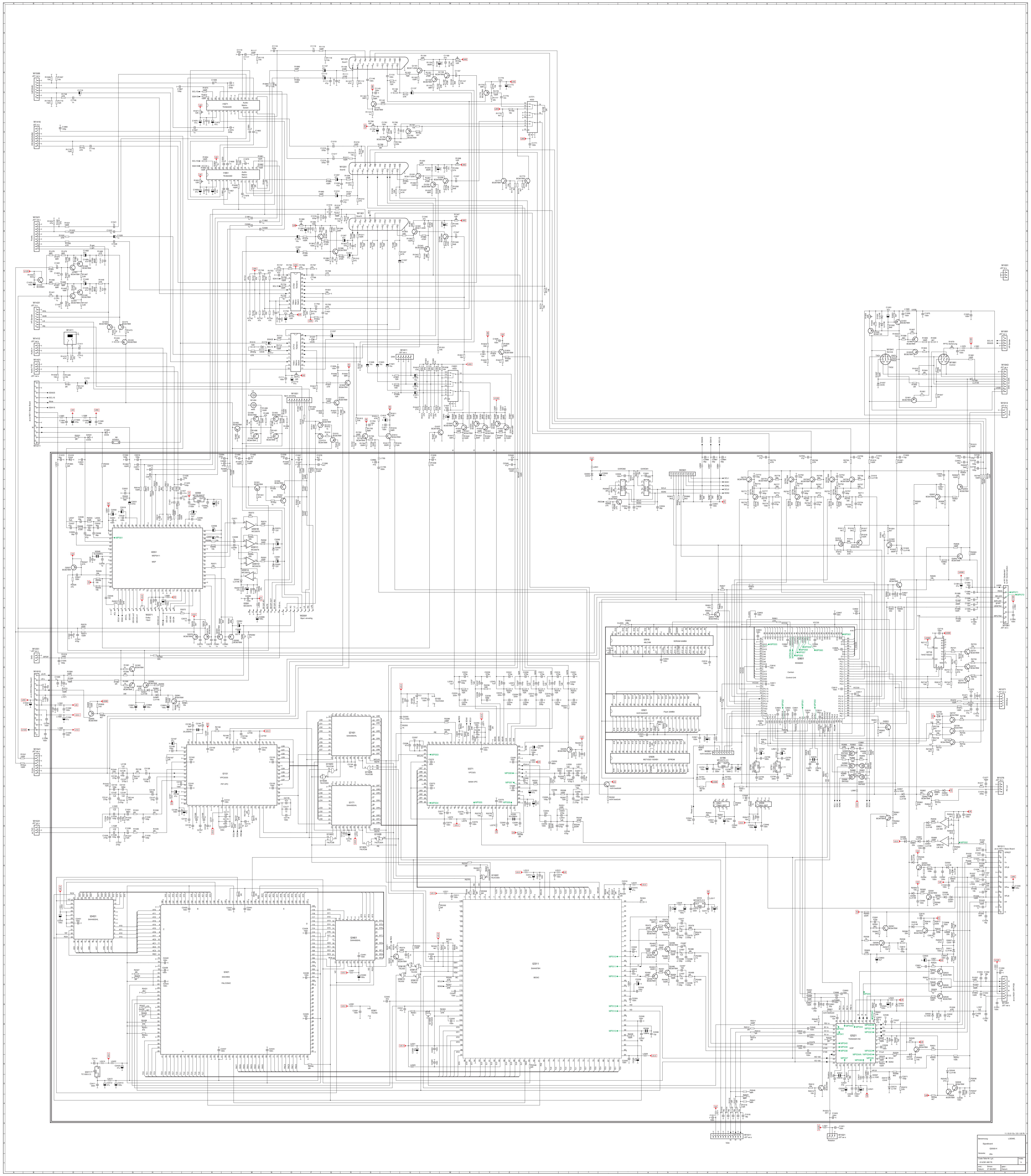






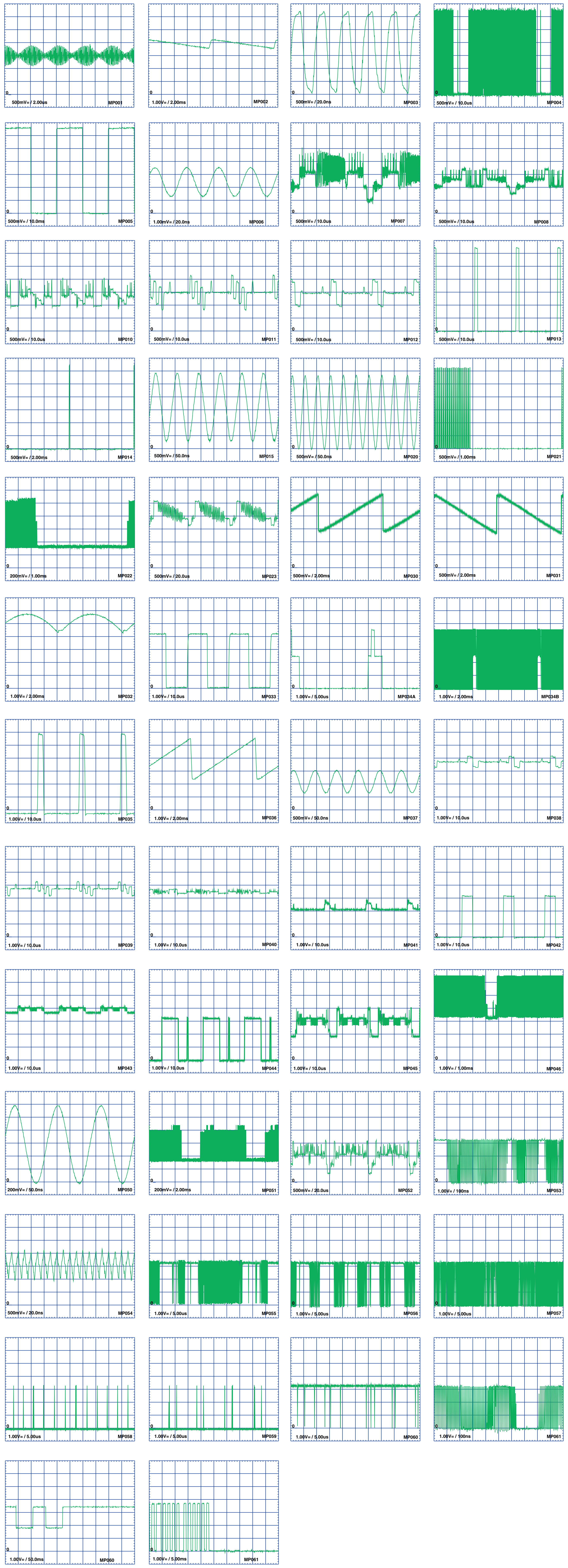


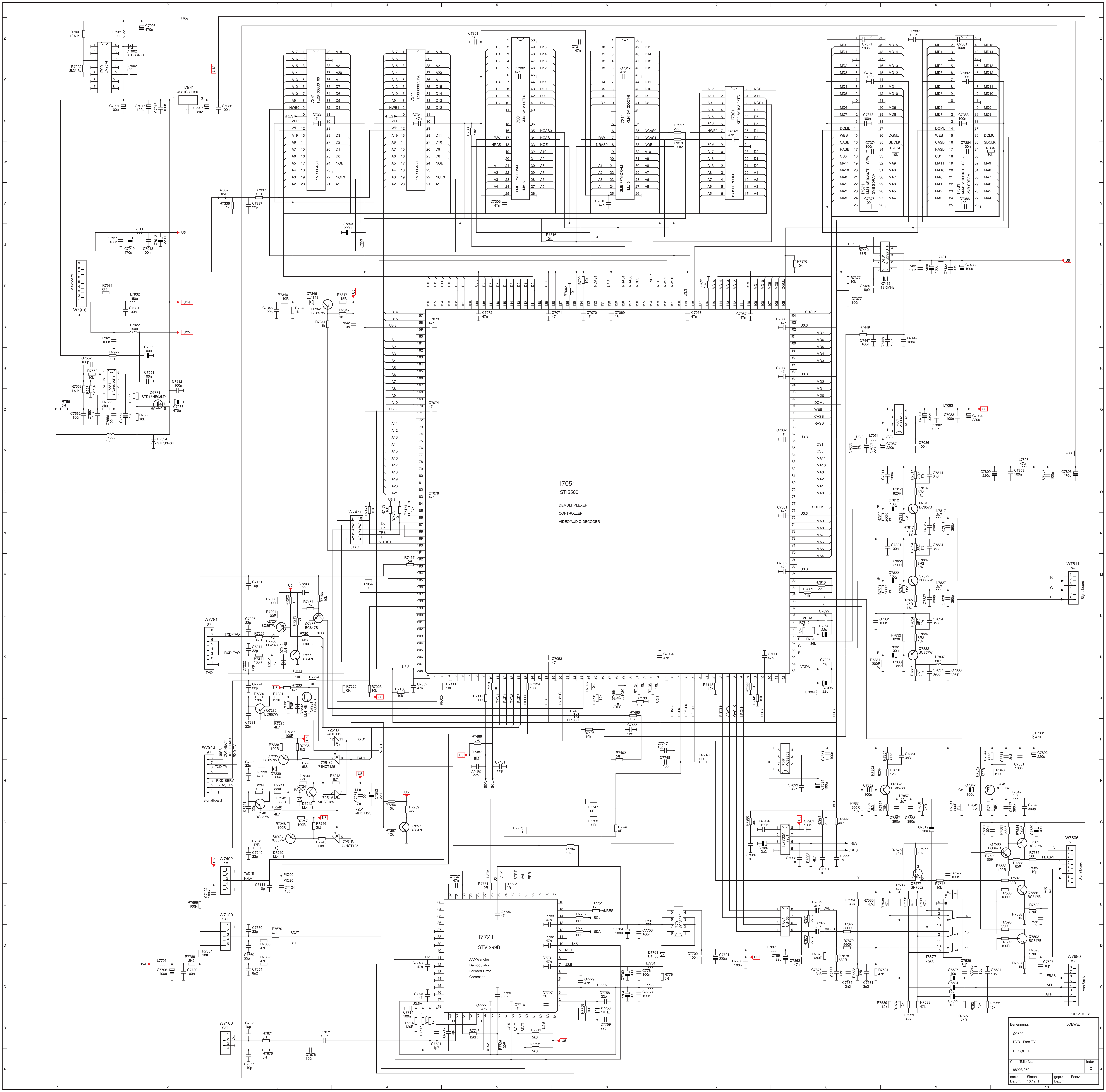


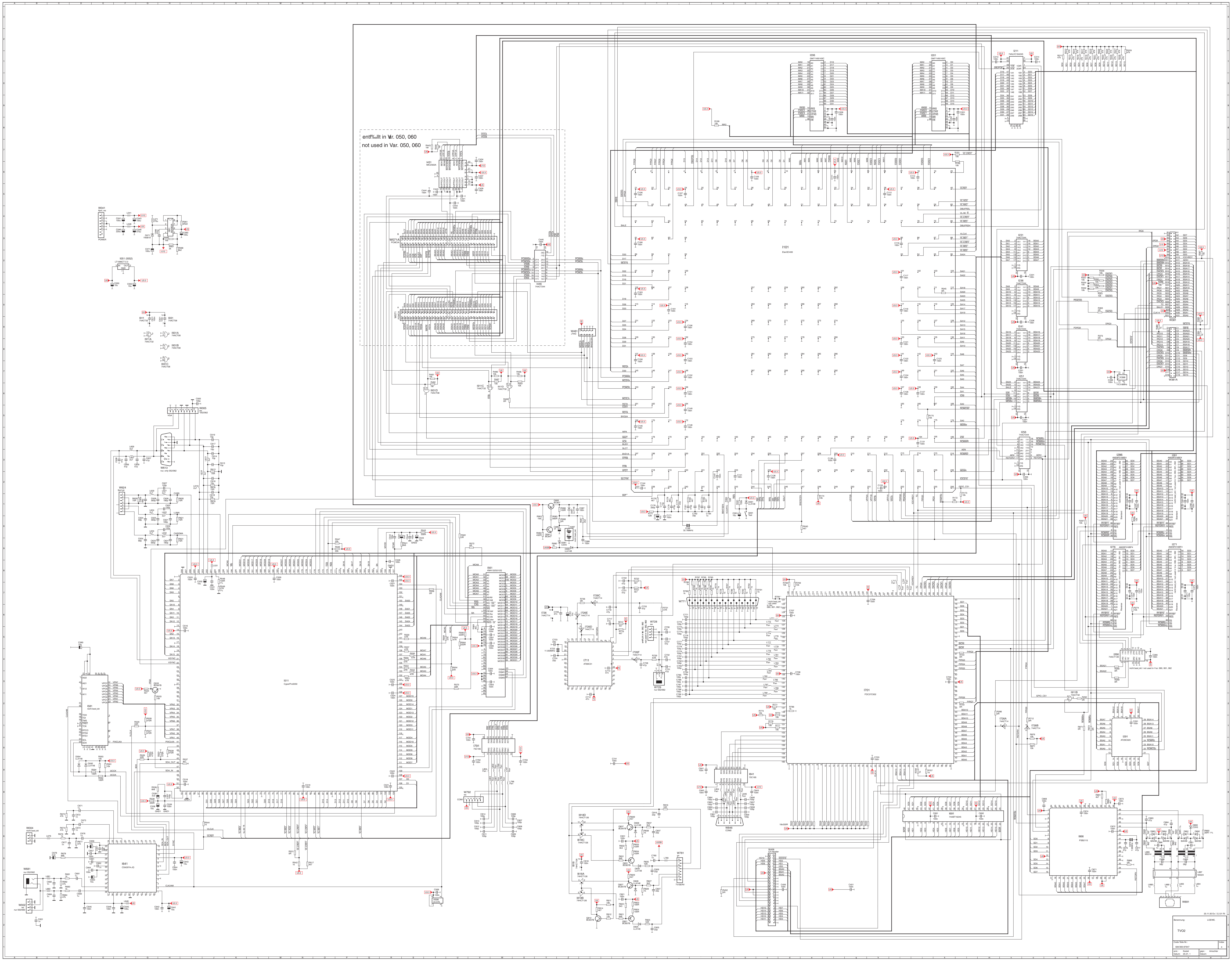


11.10.01 Ex / 23.1.02 Ri

Benennung:	LOEWE.
Signalboard	
Q2500-H	
Variante: .05x	
Code-Teile-Nr. Lpl.: 614/391-88176	Index b
erst.: Simon Datum: 27.08.2001	gepr.: Datum:




I7051
STI5500
DEMULTIPLEXER
CONTROLLER
VIDEO/AUDIO-DECODER
I7721
STV 299B
A/D-Wandler
Demodulator
Forward-Error-
Correction
I7331
TE28F008B3T90
1MB FLASH
I7341
TE28F008B3T90
1MB FLASH
I7301
KM416V1200CT-6
2MB FPM-DRAM
1Mx16
I7311
KM416V1200CT-6
2MB FPM-DRAM
1Mx16
I7321
AT28LV010A-25TC
128k EEPROM
I7371
KM416S1020CT -G/F8
2MB SDRAM
I7381
KM416S1020CT -G/F8
2MB SDRAM
I7901
LM2574
I7931
L4931CDT120
I7551
UC3843D1
I7431
MK2732-02TR
X7436
13.5MHz
I7081
MC33269
I7091
MC33269
I7701
MC33269
I7861
TDA7034
I7577
4053
I7251
74HCT125
W7471
JTAG
W7916
Baseboard
W7781
TVO
W7943
Signalboard
W7492
Test
W7120
SAT
W7100
SAT
W7611
Signalboard
W7506
Signalboard
W7680
von Sat 6
U5
U12
U14
U25
USA
RES
/RES
FBAS
AFL
AFR
10.12.01 Ex
Benennung:
LOEWE.
Q2500
DVB1-Free-TV-
DECODER
Code-Teile-Nr.:
88223.050
Index
C
erst.: Simon
Datum: 10.12. 1
gepr.: Peetz
Datum:



I431
MIC2563A
R443
1M
R444
1M
U5
C443
100n
C444
100n
I101
I701
W891
L887
N5024
L888
1u
L889
1u
L893
1u
L894
1u
C888
56p
C893
56p

entf‰llt in Var. 050, 060

not used in Var. 050, 060

20.11.00 Ex / 2.2.01 Ri

Benennung: LOEWE.

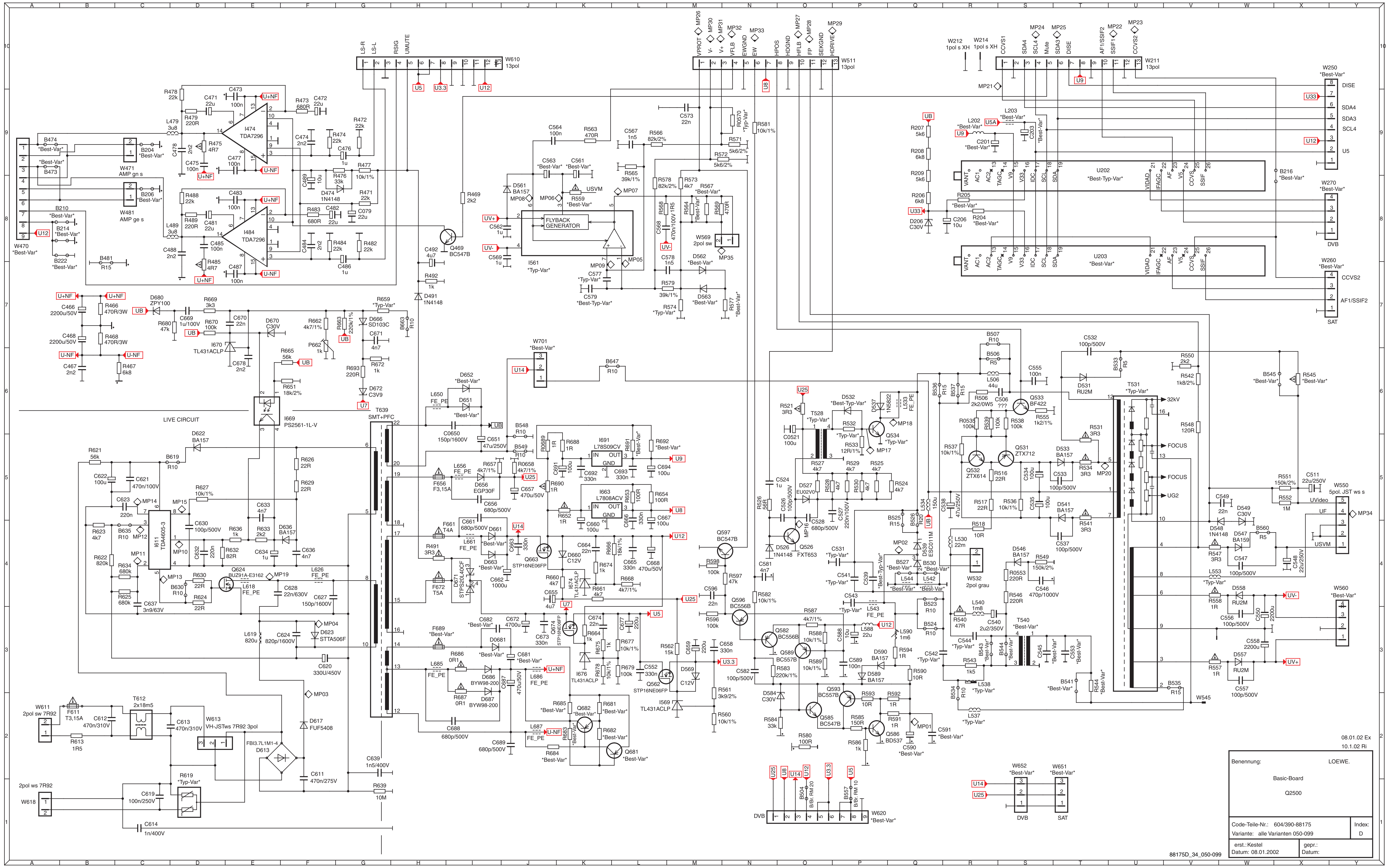
TVO2

Code-Teile-Nr.: 584/393-87647

Index e

erst.: Kestel
Datum: 25.01. 1

gepr.: Amschler
Datum:


W610 13pol
LS-R
LS-L
RSIG
UMUTE
W511 13pol
VPROT
V-
V+
VFLB
EWGND
EW
HPOS
HDGND
HFLB
FP
SEKGND
HDRIVE
W211 13pol
CCVS1
SDA4
SCL4
Mute
SDA3
DISE
AF1/SSIF2
SSIF
CCVS2
W212 1pol s XH
W214 1pol s XH
W250 *Best-Var*
DISE
SDA4
SDA3
SCL4
U5
W270 *Best-Var*
DVB
W260 *Best-Var*
CCVS2
AF1/SSIF2
SAT
U202 *Best-Typ-Var*
U203 *Best-Var*
VANT
AC1
AC2
TAGC
V9
V33
IOC
SCL
SDA
VIDAD
IFAGC
AF
VS
CCVS
SSIF
W470 *Best-Var*
W471 AMP gn s
W481 AMP ge s
I474 TDA7296
I484 TDA7296
U+NF
U-NF
Q469 BC547B
I561 *Typ-Var*
FLYBACK GENERATOR
USVM
W569 2pol sw
LIVE CIRCUIT
I669 PS2561-1L-V
I670 TL431ACLP
T639 SMT+PFC
W701 *Best-Var*
I611 TDA4605-3
Q624 BUZ91A-E3162
I691 L78S09CV
I663 L7808ACV
Q663 STP16NE06FP
Q662 STP16NE06FP
Q682
Q681 *Best-Var*
Q597 BC547B
Q596 BC556B
Q582 BC556B
Q589 BC557B
Q593 BC557B
Q585 BC547B
Q586 BD537
Q532 ZTX614
Q531 ZTX712
Q533 BF422
Q534 *Typ-Var*
T528 *Typ-Var*
T531 *Typ-Var*
T540 *Best-Var*
T612 2x18m5
W611 2pol sw 7R92
W613 VH-JSTws 7R92 3pol
W618 2pol ws 7R92
D613 FBI3.7L1M1-4
D617 FUF5408
W532 2pol grau
W550 5pol. JST ws s
UVideo
UF
USVM
W560 *Best-Var*
W545
32kV
FOCUS
UG2
UV-
UV+
W620 *Best-Var*
DVB
W652 *Best-Var*
W651 *Best-Var*
SAT
U14
U25
U3.3
U12
U8
U7
UB
U33
U5A
U9

08.01.02 Ex
10.1.02 Ri

Benennung: LOEWE.

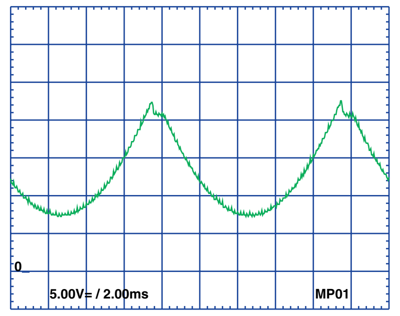
Basic-Board

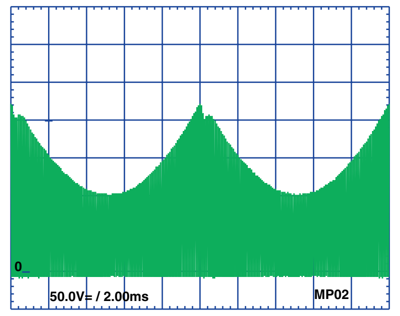
Q2500

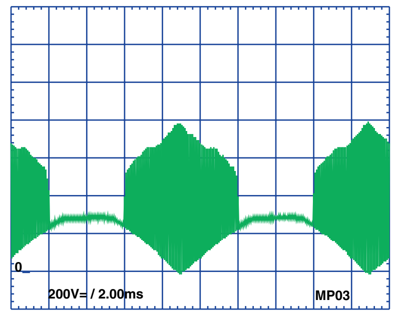
Code-Teile-Nr.: 604/390-88175
Variante: alle Varianten 050-099
Index: D

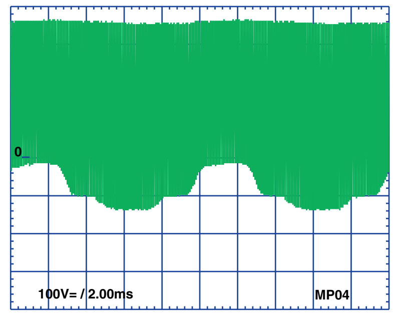
erst.: Kestel
Datum: 08.01.2002
gepr.:
Datum:

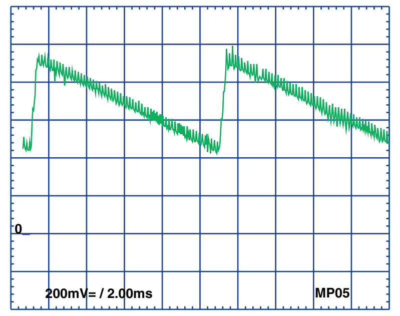
88175D_34_050-099

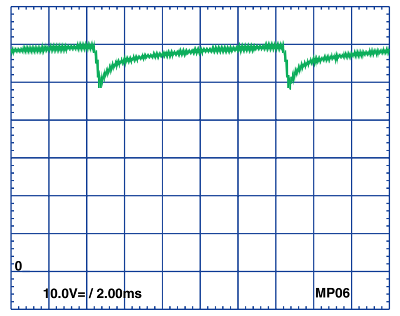


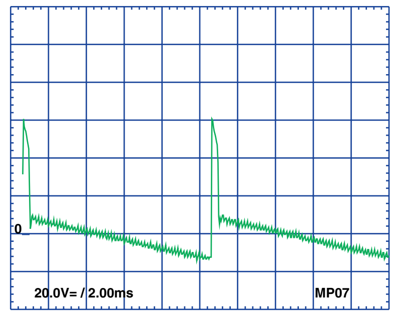


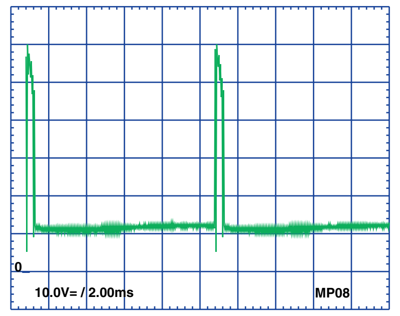


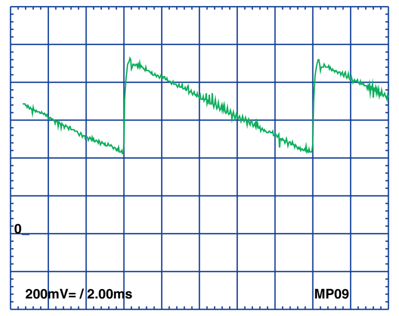


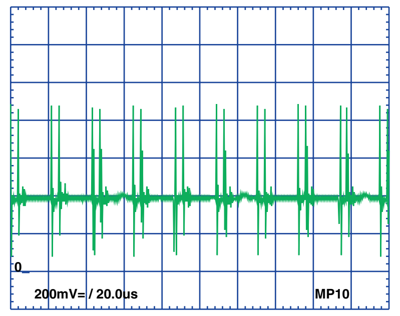


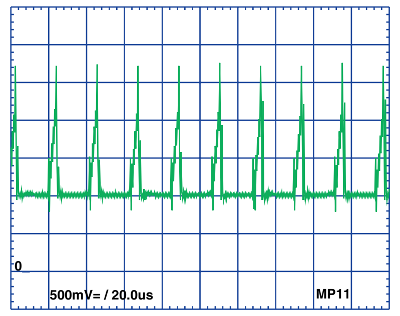


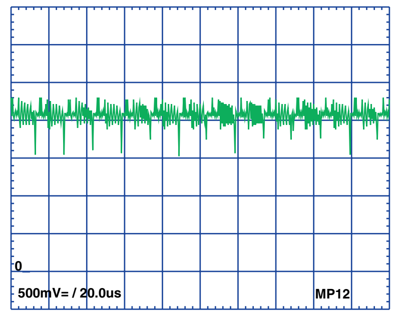


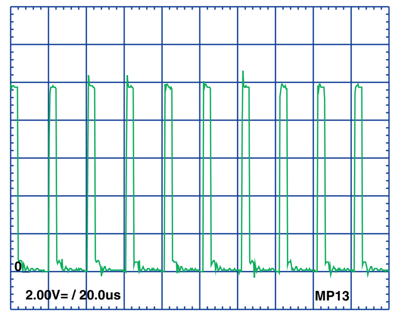


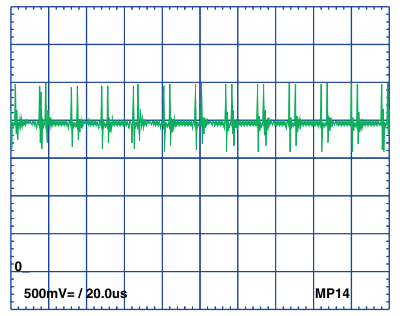


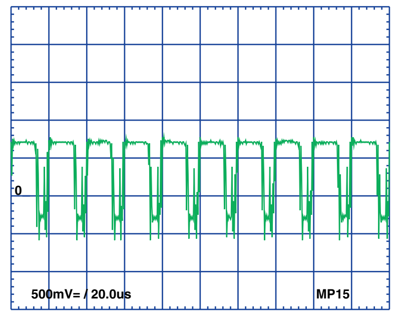


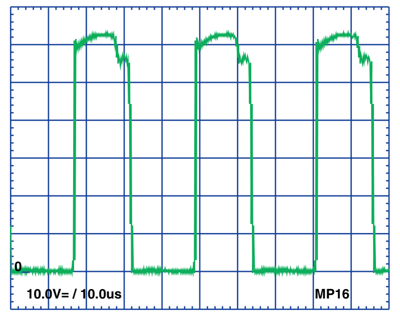


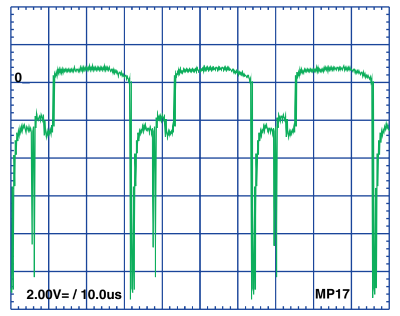


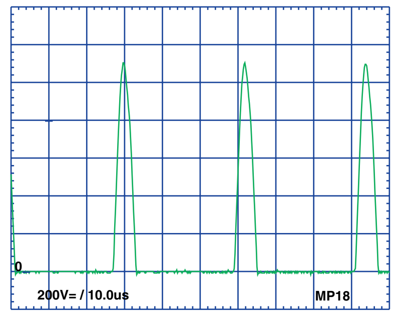


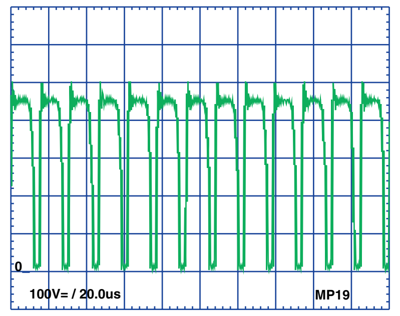


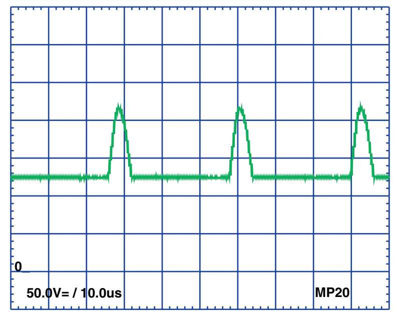


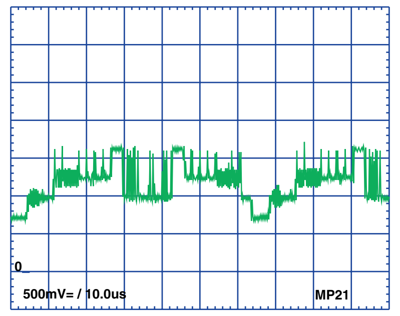


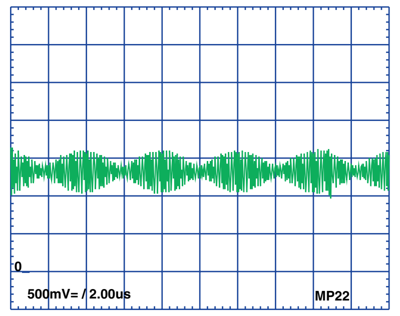


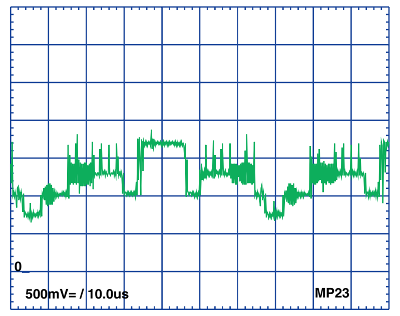


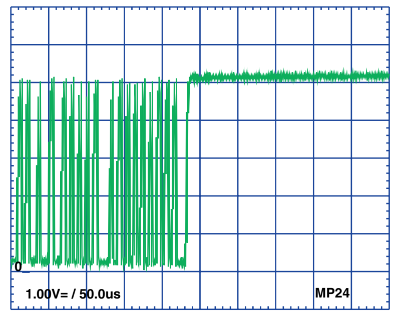


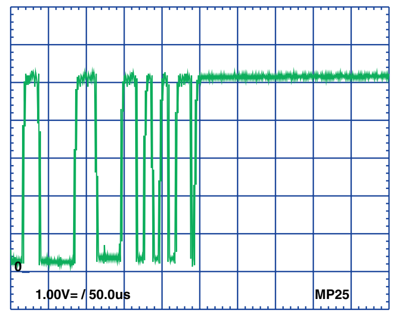


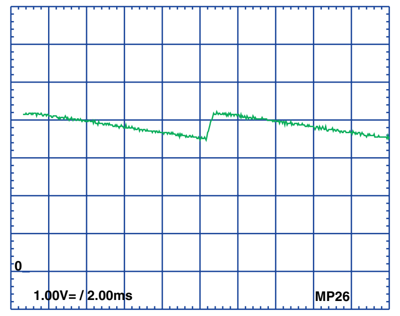


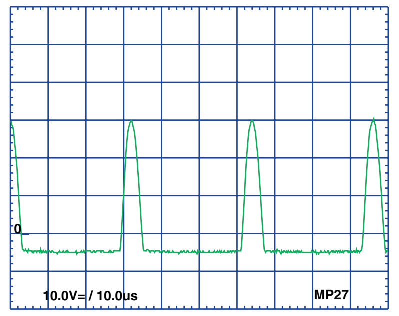


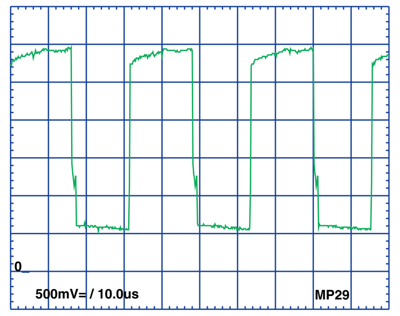


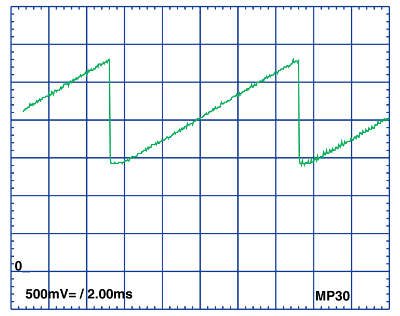


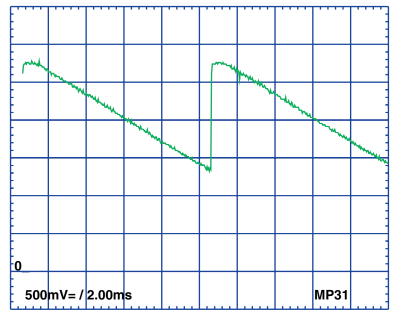


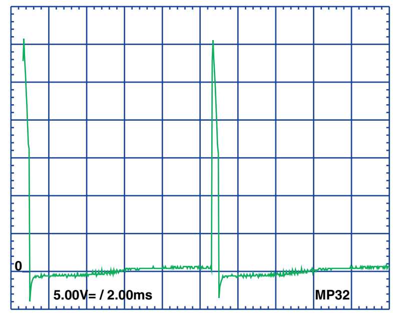


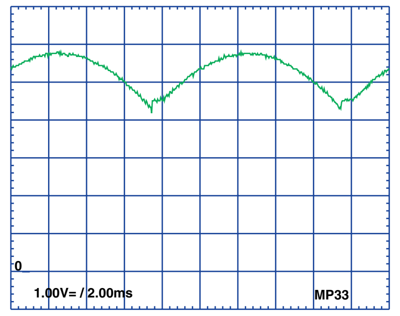


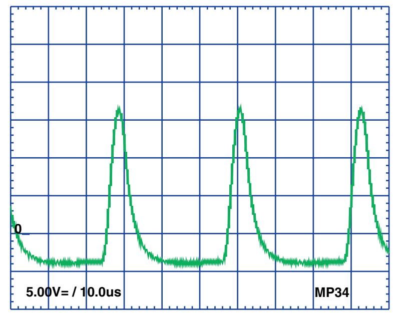


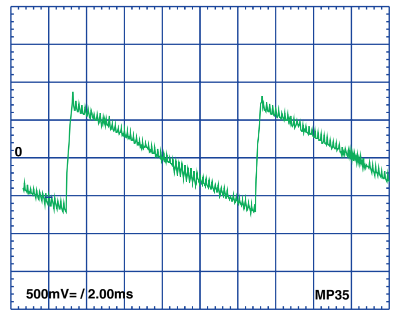


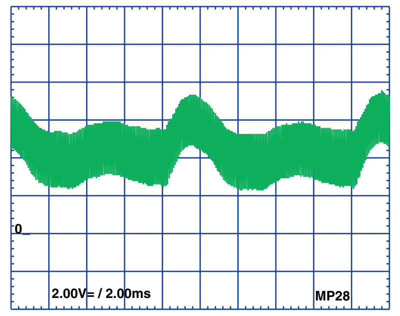


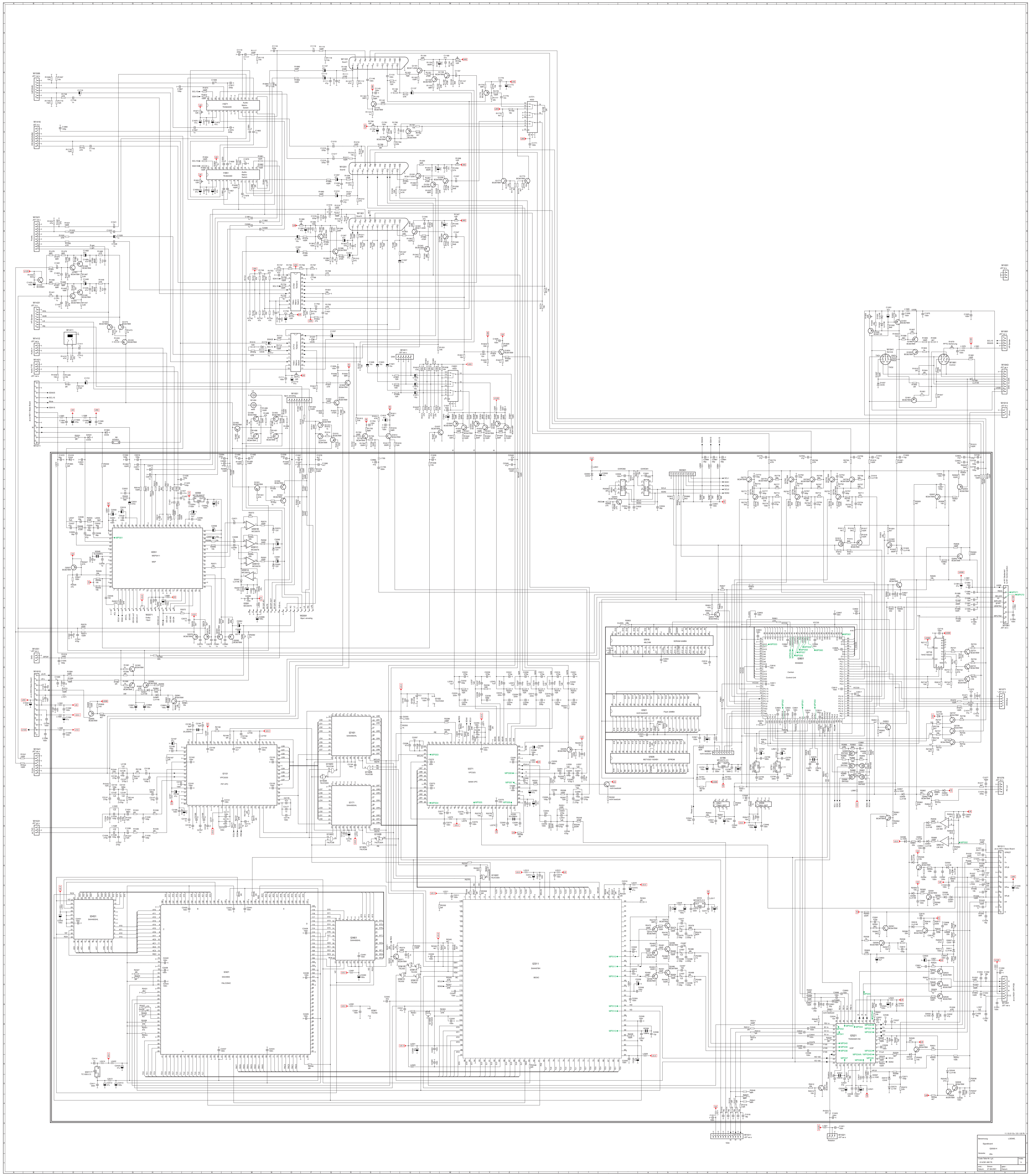










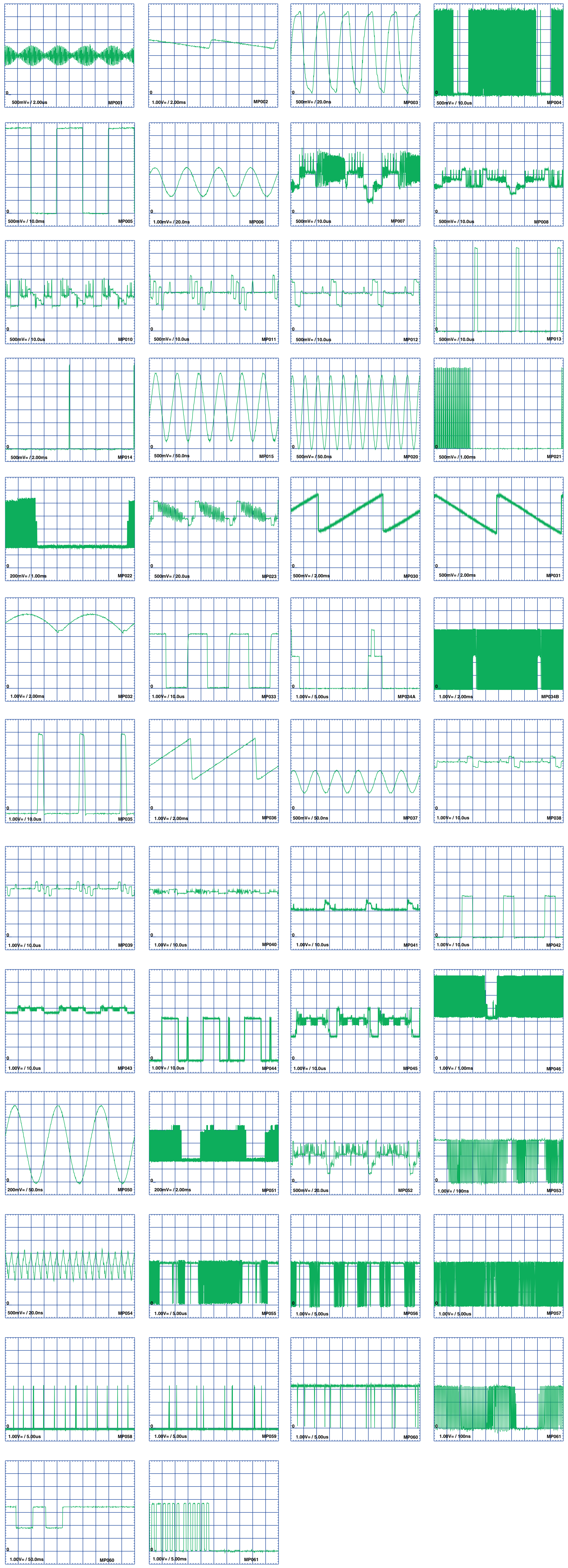


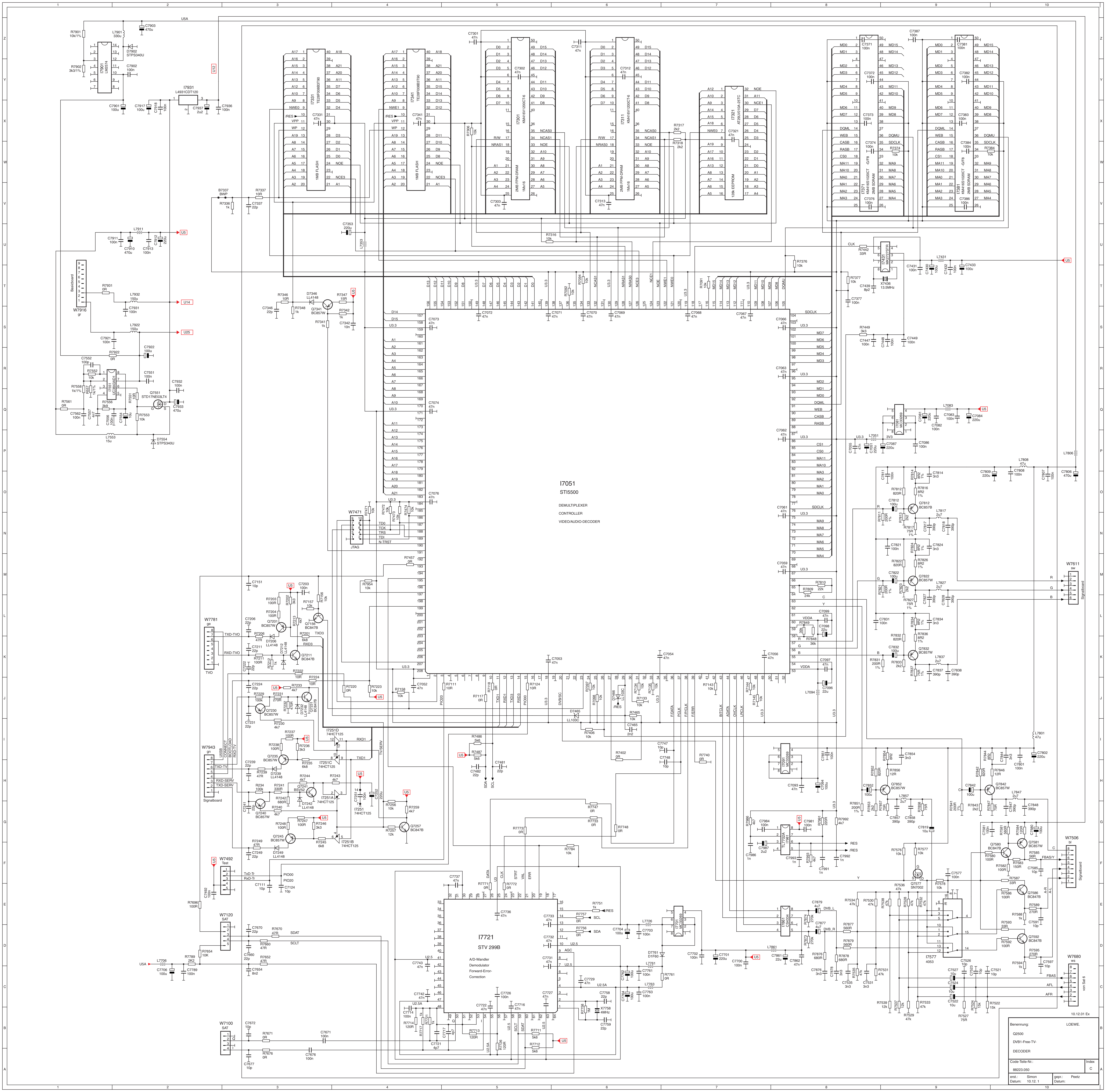
11.10.01 Ex / 23.1.02 Ri

Benennung: LOEWE.
Signalboard
Q2500-H
Variante: .05x

Code-Teile-Nr. Lpl.:	Index
614/391-88176	b

erst.: Simon
Datum: 27.08.2001
gepr.:
Datum:




I7051
STI5500
DEMULTIPLEXER
CONTROLLER
VIDEO/AUDIO-DECODER
I7721
STV 299B
A/D-Wandler
Demodulator
Forward-Error-
Correction
I7331
TE28F008B3T90
1MB FLASH
I7341
TE28F008B3T90
1MB FLASH
I7301
KM416V1200CT-6
2MB FPM-DRAM
1Mx16
I7311
KM416V1200CT-6
2MB FPM-DRAM
1Mx16
I7201
AT29LV010A-25TC
128k EEPROM
I7371
KM416S1020CT -GF8
2MB SDRAM
I7381
KM416S1020CT -GF8
2MB SDRAM
I7901
LM2574
I7931
L4931CDT120
I7551
UC3843D1
I7431
MC74HC73E
X7436
13.5MHz
I7081
MC33269
I7091
MC33269
I7701
MC33269
I7251
74HCT125
I7702A
TL7702
I7861
TDA7050
I7577
4053
W7471
JTAG
W7916
Baseboard
W7781
TVO
W7943
Signalboard
W7492
Test
W7120
SAT
W7100
SAT
W7611
Signalboard
W7506
Signalboard
W7680
von Sat 6
FBAS
AFL
AFR
U5
U12
U14
U25
USA
10.12.01 Ex

Benennung: LOEWE.

Q2500

DVB1-Free-TV-

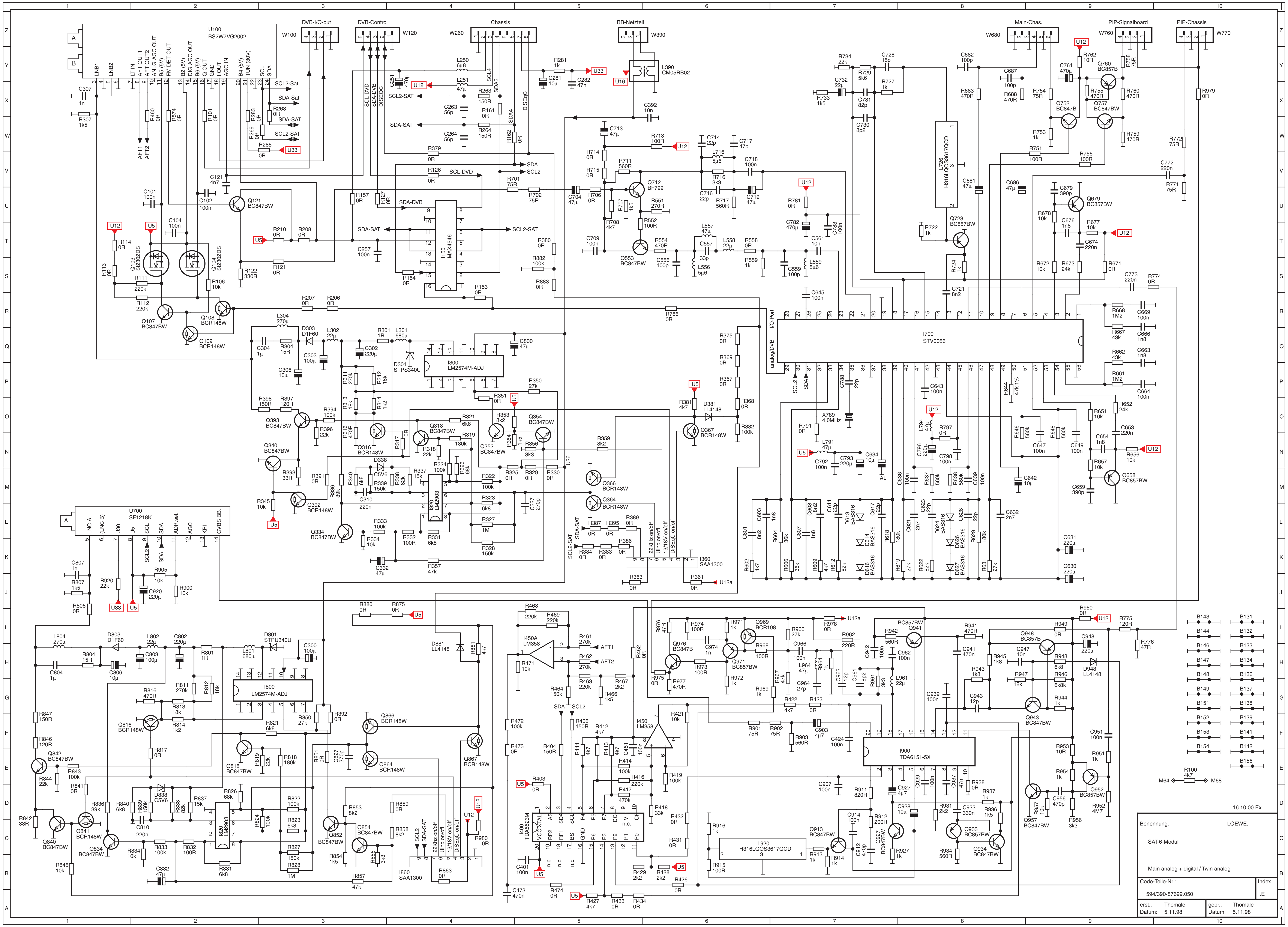
DECODER

Code-Teile-Nr.: 88223.050

Index C

erst.: Simon
Datum: 10.12. 1

gepr.: Peetz
Datum:


U100
BS2W7VG2002
W100
DVB-I/Q-out
DVB-Control
W120
W260
Chassis
BB-Netzteil
W390
L390
CM05RB02
W680
Main-Chas.
W760
PIP-Signalboard
PIP-Chassis
W770
I150
MAX4546
I300
LM2574M-ADJ
U700
SF1218K
I320
LM2903
I360
SAA1300
I700
STV0056
L726
H316LQOS3617QCD
I800
LM2574M-ADJ
I820
LM2903
I860
SAA1300
I400
TDA5523M
I450A
LM358
I450
LM358
I900
TDA6151-5X
L920
H316LQOS3617QCD
X789
4,0MHz
U5
U12
U12a
U33
U16
AFT1
AFT2
SDA
SCL2
SDA-SAT
SCL2-SAT
SCL-DVD
SDA-DVB
DISEqC
22KHz on/off
Ulnc on/off
13/18V on/off
DiSEqC on/off
M64
M68
R100
4k7
B143
B144
B146
B147
B148
B149
B151
B152
B153
B154
B131
B132
B133
B134
B136
B137
B138
B139
B141
B142
B156
1
2
3
4
5
6
7
8
9
10
Z
Y
X
W
V
U
T
S
R
Q
P
O
N
M
L
K
J
I
H
G
F
E
D
C
B
A

16.10.00 Ex

Benennung: LOEWE.

SAT-6-Modul

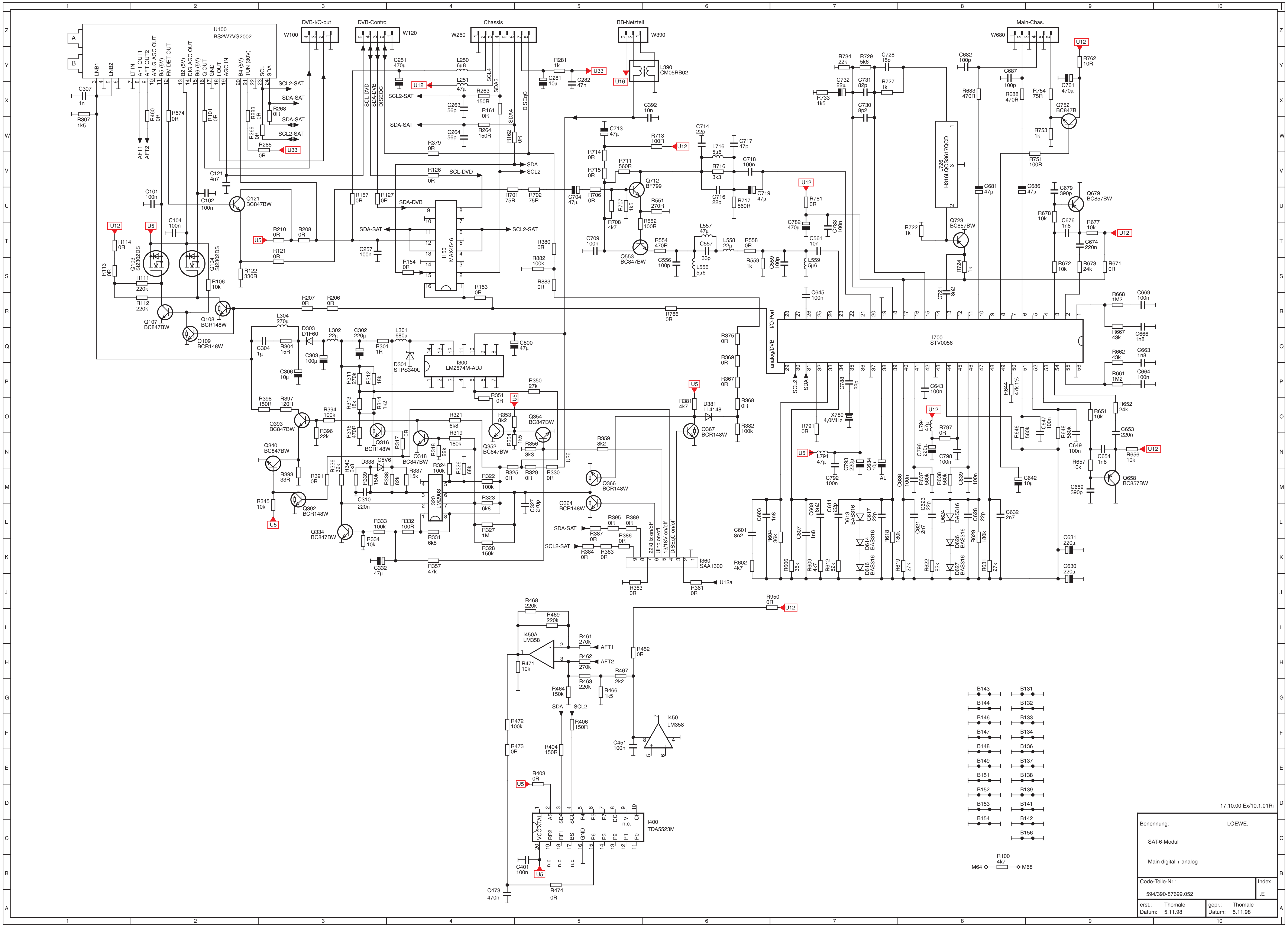
Main analog + digital / Twin analog

Code-Teile-Nr.: 594/390-87699.050

Index .E

erst.: Thomale Datum: 5.11.98

gepr.: Thomale Datum: 5.11.98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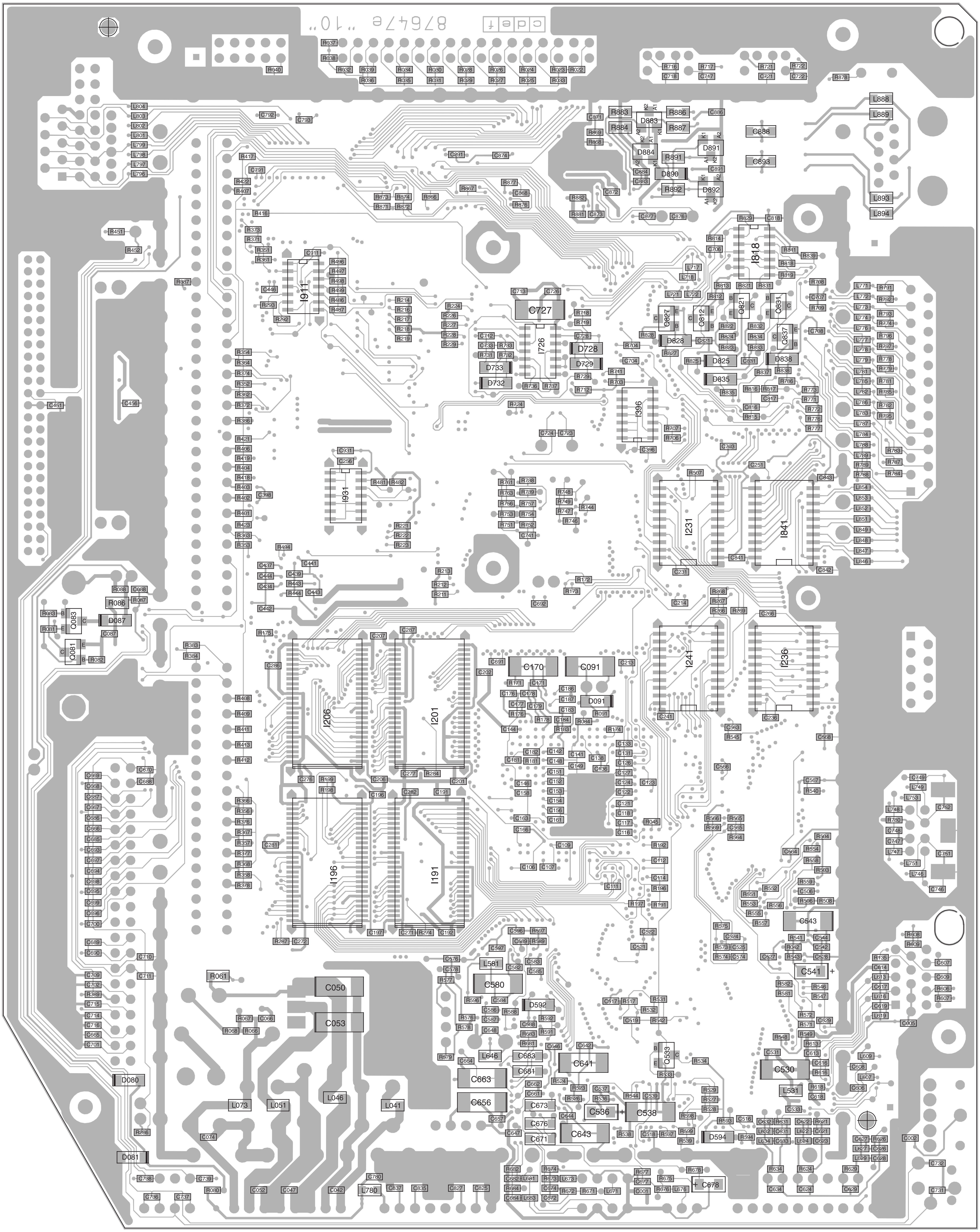
BS2W7VG2002
LNB1
LNB2
LT IN
AFT OUT1
AFT OUT2
ANLG AGC OUT
B5 (5V)
FM DET OUT
B2 (5V)
DIG AGC OUT
B6 (5V)
Q OUT
GND
I OUT
AGC IN
B4 (5V)
TUN (30V)
SCL
SDA
DVB-I/Q-out
W100
DVB-Control
W120
Chassis
W260
BB-Netzteil
W390
L390
CM05RB02
Main-Chas.
W680
SCL-DVD
SDA-DVB
DISEQC
SCL2-SAT
SDA-SAT
SCL4
SDA3
SDA4
SDA
SCL2
SCL-DVD
SDA-DVB
DiSEqC
AFT1
AFT2
U12
U5
U16
U33
Q121
BC847BW
Q103
SI2302DS
Q104
SI2302DS
Q107
BC847BW
Q108
BCR148W
Q109
BCR148W
I150
MAX4546
Q712
BF799
Q553
BC847BW
L726
H316LQOS3617QCD
Q723
BC857BW
Q752
BC847B
Q679
BC857BW
I700
STV0056
I/O-Port
analog/DVB
D303
D1F60
D301
STPS340U
I300
LM2574M-ADJ
Q393
BC847BW
Q340
BC847BW
Q316
BCR148W
Q318
BC847BW
Q352
BC847BW
Q354
BC847BW
Q392
BCR148W
Q334
BC847BW
I320
LM2903
D338
C5V6
D381
LL4148
Q367
BCR148W
Q366
BCR148W
Q364
BCR148W
22kHz on/off
Ulnc on/off
13/18V on/off
DiSEqC on/off
I360
SAA1300
U12a
X789
4,0MHz
L791
47µ
L794
47µ
D613
BAS316
D614
BAS316
D616
BAS316
D624
BAS316
D626
BAS316
D627
BAS316
Q658
BC857BW
AL
I450A
LM358
I450
LM358
I400
TDA5523M
VCCXTAL
AS
SDA
SCL
P4
P5
P7
IDC
VT
CF
RF2
RF1
BS
GND
P6
P3
P2
P1
P0
n.c.
B143
B144
B146
B147
B148
B149
B151
B152
B153
B154
B131
B132
B133
B134
B136
B137
B138
B139
B141
B142
B156
R100
4k7
M64
M68
1
2
3
4
5
6
7
8
9
10
Z
Y
X
W
V
U
T
S
R
Q
P
O
N
M
L
K
J
I
H
G
F
E
D
C
B
A

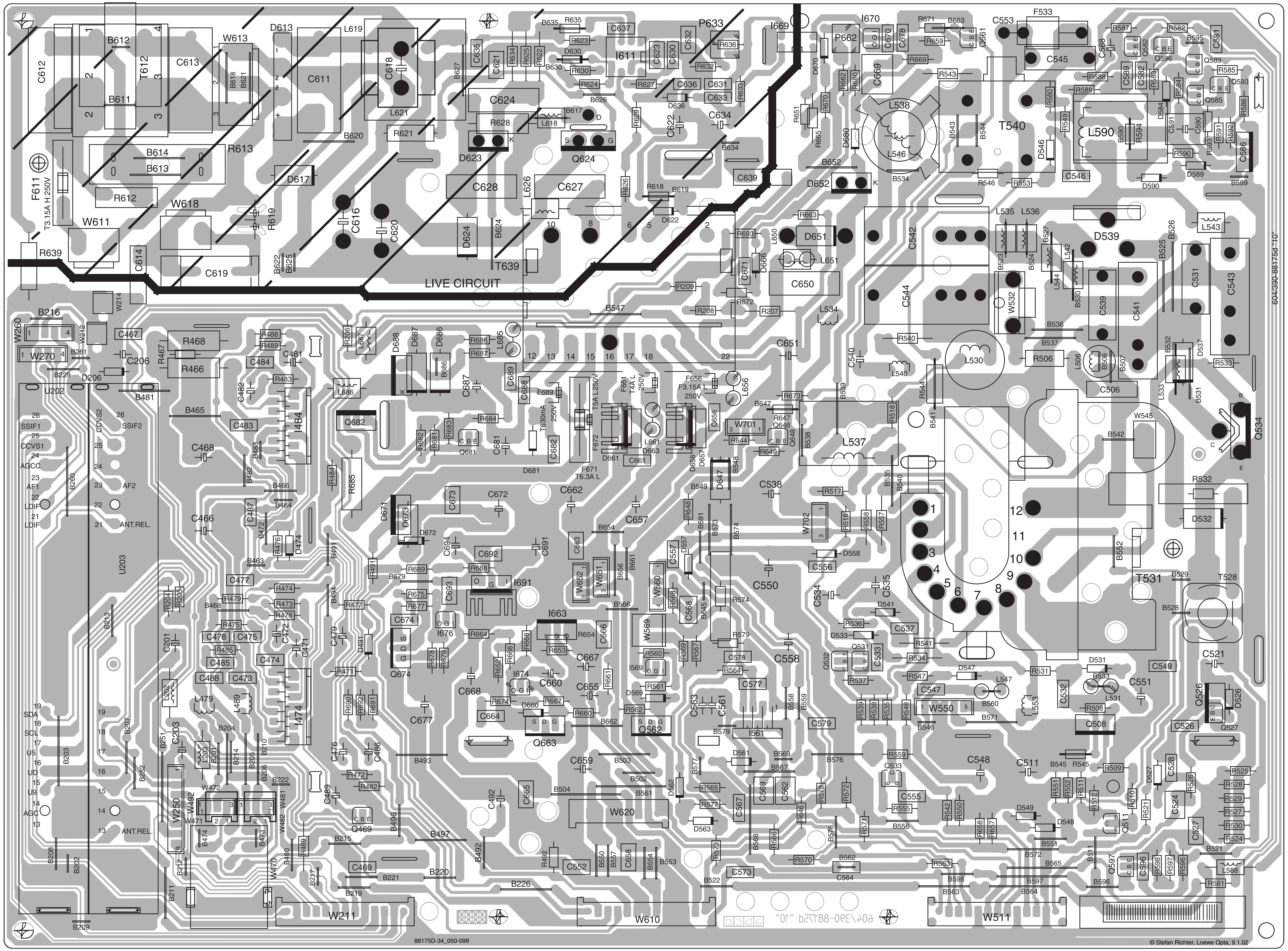
17.10.00 Ex/10.1.01Ri

Benennung:	LOEWE.
SAT-6-Modul	
Main digital + analog	
Code-Teile-Nr.: 594/390-87699.052	Index .E
erst.: Thomale Datum: 5.11.98	gepr.: Thomale Datum: 5.11.98


87647e "10"
c d e f
I911
I931
I726
C727
I818
I396
I231
I841
I241
I236
I206
I201
I196
I191
C170
C091
C050
C053
C580
C641
C663
C656
C643
C536
C538
C530
C543
C541
D080
D081

Leiterplatte TVO2 87647E
Lötseite

TVO2 P.C.B. 87647E
Solder Side


LIVE CIRCUIT
F611
T3.15A H 250V
R639
W611
R612
W618
B614
B613
R613
B612
B611
T612
C612
C613
W613
D613
C611
L619
C618
L621
D617
R619
C616
C620
C619
C614
W214
B216
W260
W270
C467
R468
R467
R466
C206
D206
B229
B261
W212
U202
B481
B465
R621
B620
C624
R628
L618
B617
D623
Q624
C628
L626
C627
D624
B624
T639
R626
R618
B619
D622
R635
B635
C637
R623
D630
R630
C621
R634
R625
R622
C635
B630
R624
B626
I611
C623
C630
C632
P633
R636
R632
R627
C636
C631
D636
C633
R633
C634
C622
R629
B634
C639
I669
I670
P662
C670
C678
R671
B663
R659
Q661
R669
C669
R662
R680
D670
R651
R670
R665
D680
L538
L546
B534
B652
D652
R663
C553
F533
C545
R543
T540
B543
B544
R546
R553
C546
R588
R589
R580
R549
D546
L590
B590
R594
R590
D590
D589
B589
Q586
R586
R587
R582
C581
C588
Q582
Q596
B595
Q589
R585
Q593
Q585
C589
C582
B583
R584
D584
C591
C590
R591
R592
R593
L543
D539
B526
B525
C531
C543
L535
L536
B527
B523
B524
L542
L544
W532
B530
C539
C541
B536
B537
R506
L506
B506
B507
C506
B532
D537
L533
B531
R533
Q534
W545
B542
R532
D532
T531
B529
T528
B528
C521
C549
C551
Q526
D526
Q527
C526
R525
R528
R529
R527
R530
R524
C527
B521
L588
R581
C524
R526
C528
D527
C542
C544
L651
D651
C650
L650
R693
D666
C671
R209
R208
R672
R207
B547
L534
C540
L540
R540
L530
C651
R673
B647
R647
Q646
Q648
W701
R644
R649
B539
L537
B538
B541
R544
R518
R517
B535
B540
C538
D647
B548
B549
W702
R516
R558
R557
D558
C556
C535
C534
D541
C550
R536
C537
D533
Q531
C533
Q532
R541
R534
R547
D547
L547
C547
W550
B560
R531
D531
B533
L531
R508
Q508
C532
L553
B571
R539
R538
R535
R548
B546
C548
C511
B545
R545
R509
R551
R552
R511
R512
R510
R521
Q511
D549
D548
B551
B572
B565
B511
Q597
C596
R598
R597
R596
B596
B564
B597
B563
B598
R563
R559
Q533
C555
R555
B556
R542
R550
R658
R657
C579
B576
B567
B569
D561
I561
B579
C563
C561
B558
B559
R562
Q562
D569
R561
I569
R560
W569
R564
C577
C558
R579
C578
R574
R569
R567
B566
R566
C568
B645
W560
C557
D557
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B573
B574
R648
D562
R565
R577
D563
C567
C569
C562
R646
R578
R572
B578
R571
B568
R568
R573
C573
B522
R570
B562
C564
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W620
B504
B502
B561
B503
C659
B662
R660
Q663
C664
R674
D660
R667
I674
C660
C655
R661
C667
R653
R654
C666
I663
R666
R668
R652
C668
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B492
R492
C552
B550
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C658
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B553
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B221
B219
B497
B496
B493
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Q674
C674
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R678
R679
C693
I691
R688
R689
C692
C694
C691
C673
C672
C662
C657
B654
C663
W652
W651
B656
B661
D671
D673
D672
R685
R484
B491
R491
B679
Q682
R682
R681
R683
Q681
R684
C681
D681
C682
F672
F671
T6.3A L
T5A L250V
F661
T4A L
250V
F656
F3.15A L
250V
L656
C656
D661
C661
L661
D663
D656
D657
F689
T630mA
250V
C689
C688
C687
L685
R686
R687
D688
D687
D686
B686
L687
R206
L686
I484
C484
R483
C481
R488
R489
C482
C483
C468
B483
B482
B466
B464
C487
R476
D474
B472
C466
B463
C477
R474
R473
R478
R479
B468
C478
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R475
R485
C485
C474
C472
C471
C479
D491
R471
B434
R477
C488
C473
L479
L489
I474
R690
R692
R691
C476
C486
R472
R482
C489
Q469
B222
W470
W481
W482
B480
R469
B215
C469
B217
W472
W492
W471
B474
B473
B205
B206
B210
B214
B204
L203
B201
C203
B251
W250
B212
B211
R204
R205
C201
L202
B213
U203
B207
B252
B203
B208
B202
B209
B260
W211
W511
SSIF1
SSIF2
CCVS2
CCVS1
AGCC
AF1
AF2
LDIF
ANT.REL.
SDA
SCL
U5
UD
U9
AGC
604/390-88175d "10"

88175D-34_050-099

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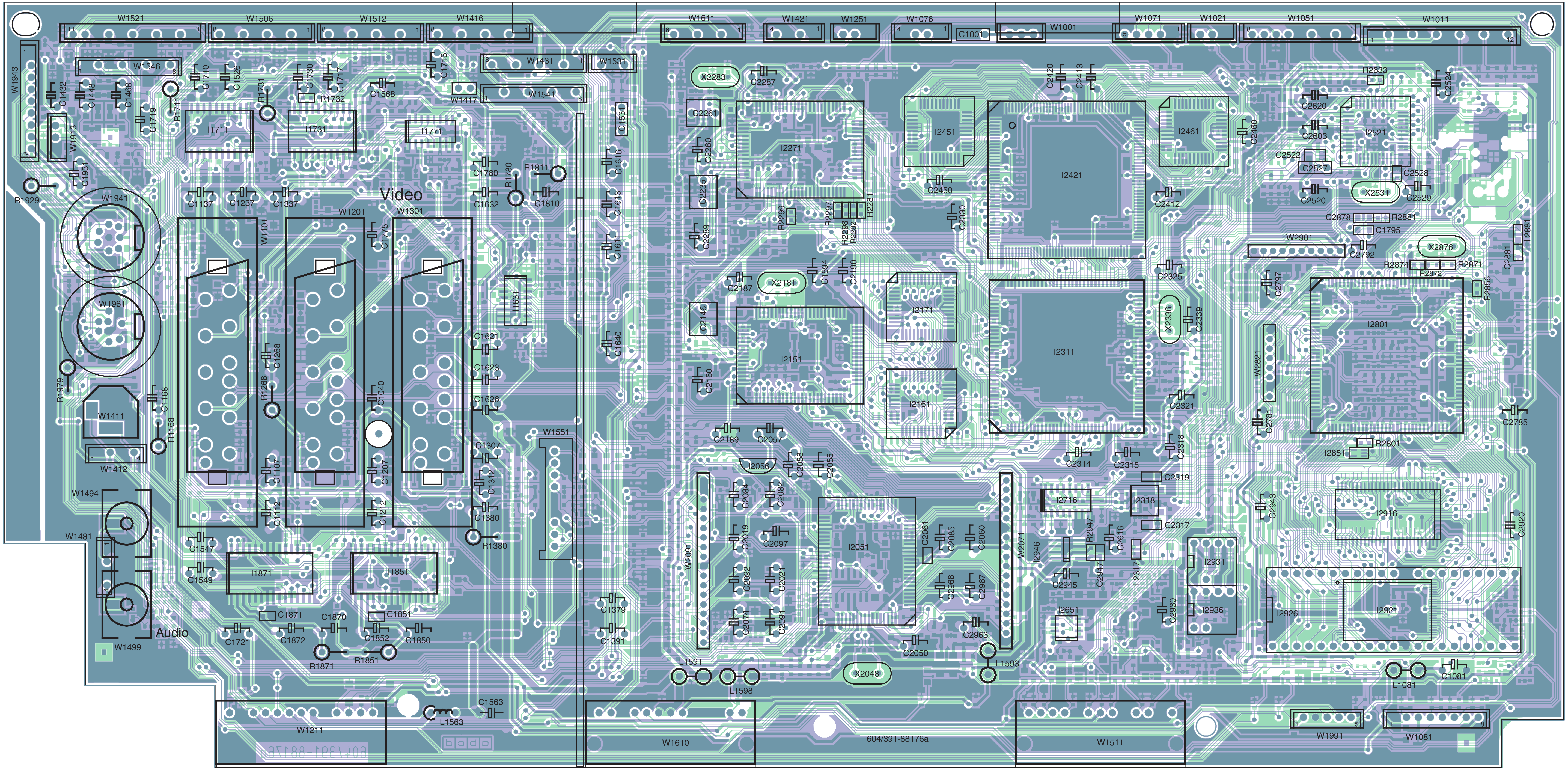
W1521
W1506
W1512
W1416
W1611
W1421
W1251
W1076
C1001
W1001
W1071
W1021
W1051
W1011
W1943
C1432
C1448
C1468
W1546
C1719
R1711
C1710
C1526
R1731
C1730
R1732
C1717
C1568
C1716
W1431
W1531
W1417
W1541
I1711
I1731
I1771
W1913
C1931
R1929
C1137
C1237
C1337
Video
C1780
C1632
R1780
R1811
C1810
C1531
C1616
C1613
C1611
C1640
W1941
W1961
W1201
W1301
W1101
C1775
I1631
C1268
R1268
C1040
C1621
C1623
C1626
C1307
C1312
C1380
R1380
C1107
C1207
C1112
C1212
R1979
W1411
C1168
R1168
W1412
W1494
W1481
C1547
C1549
I1871
I1851
W1551
C1379
C1391
C1871
C1870
C1851
C1721
C1872
C1852
C1850
Audio
W1499
R1871
R1851
W1211
L1563
C1563
W1610
X2283
C2287
C2261
C2280
I2271
C2235
C2289
R2299
R2297
R2298
R2282
R2281
C2187
X2181
C1594
C2190
C2146
I2151
C2160
I2171
I2161
C2189
C2057
I2056
C2058
C2055
C2084
C2082
C2019
C2097
C2092
C2021
C2074
C2091
W2091
I2051
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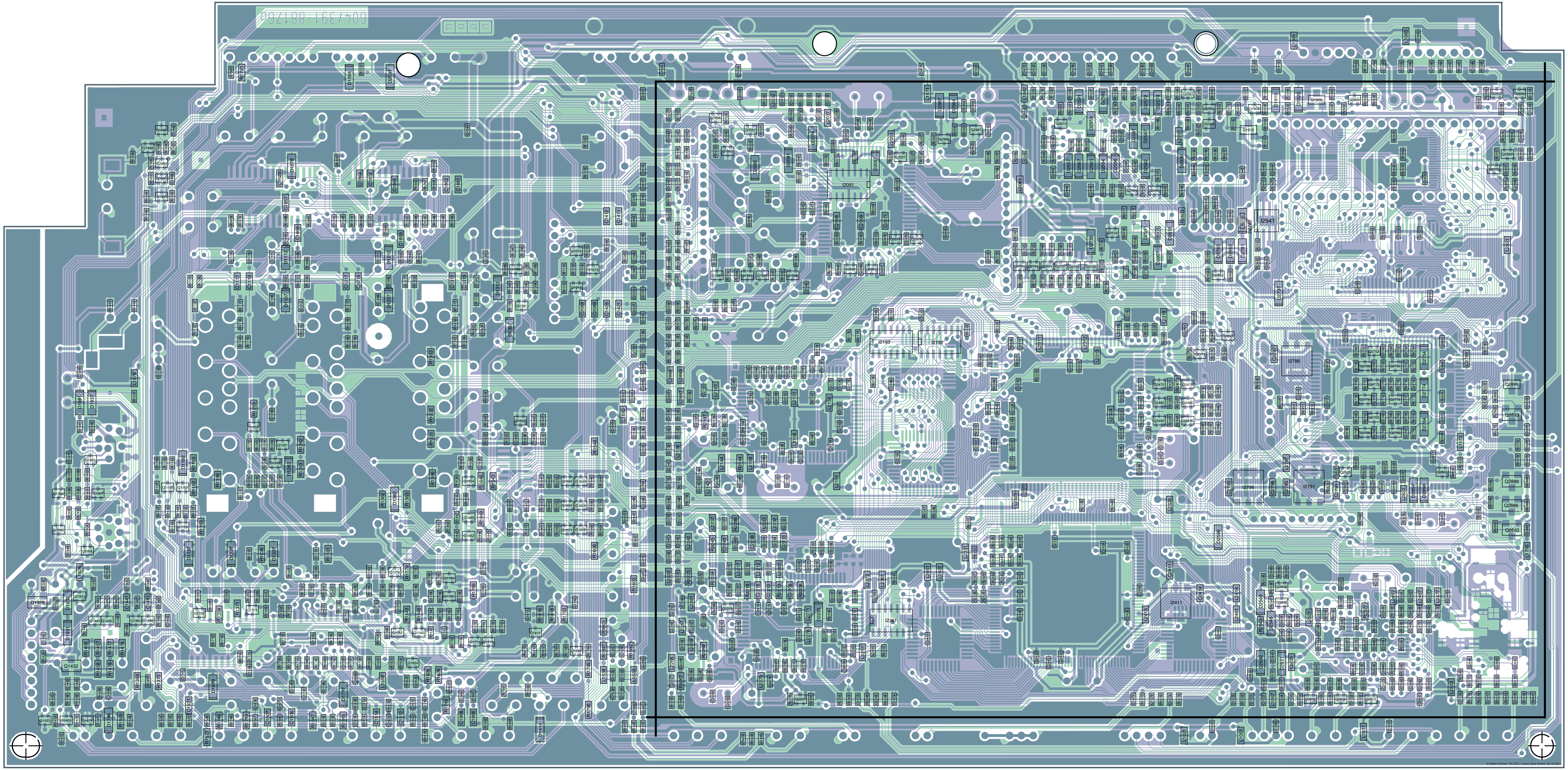
C2060
C2968
C2967
C2963
C2050
L1591
L1598
X2048
L1593
I2451
C2450
C2330
C2420
C2413
I2421
I2461
C2412
C2460
C2325
X2336
C2339
I2311
C2321
C2318
C2314
C2315
C2319
I2716
I2318
C2317
W2071
I2946
R2947
C2947
C2616
L2317
C2945
I2651
C2930
I2931
I2936
R2633
C2620
C2603
C2524
I2521
C2522
C2527
C2528
C2520
X2531
C2529
C2878
R2881
C1795
W2901
C2732
X2876
R2874
R2872
R2871
C2881
L2881
C2797
R2856
W2821
I2801
C2781
C2785
I2851
R2801
C2943
I2916
C2920
I2926
I2921
W1991
W1081
L1081
C1081
W1511
604/391-88176a

Leiterplatte Signal Board 88176A (Q2500H) Bestückungsseite

Signal Board P.C.B 88176A (Q2500H) Components side


I2091
I2941
I2193
I2192
I2786
I2796
I2791
I2411
I2361

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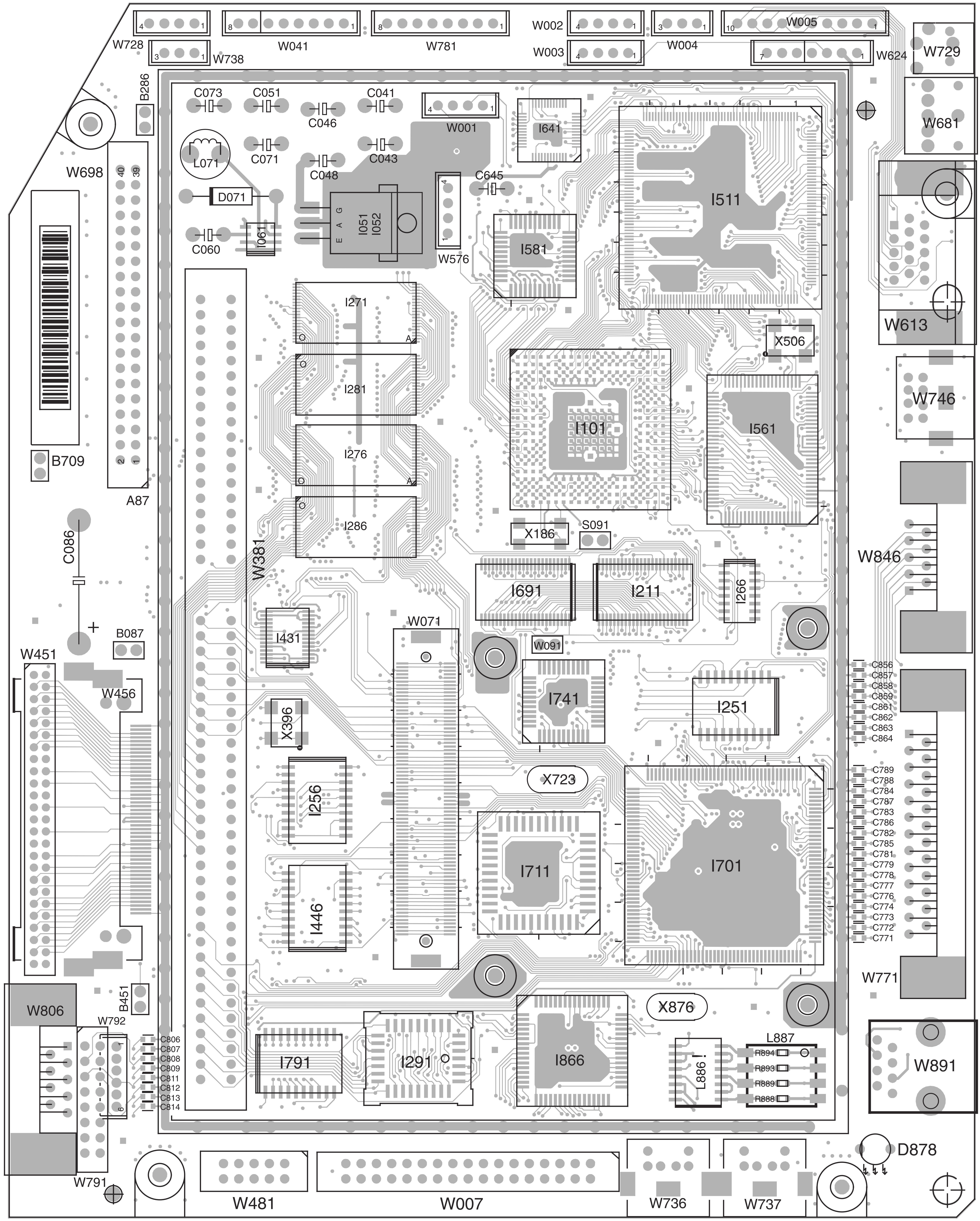
Leiterplatte Signal Board 88176A (Q2500H) Lötseite

Signal Board P.C.B 88176A (Q2500H) Solder side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C785
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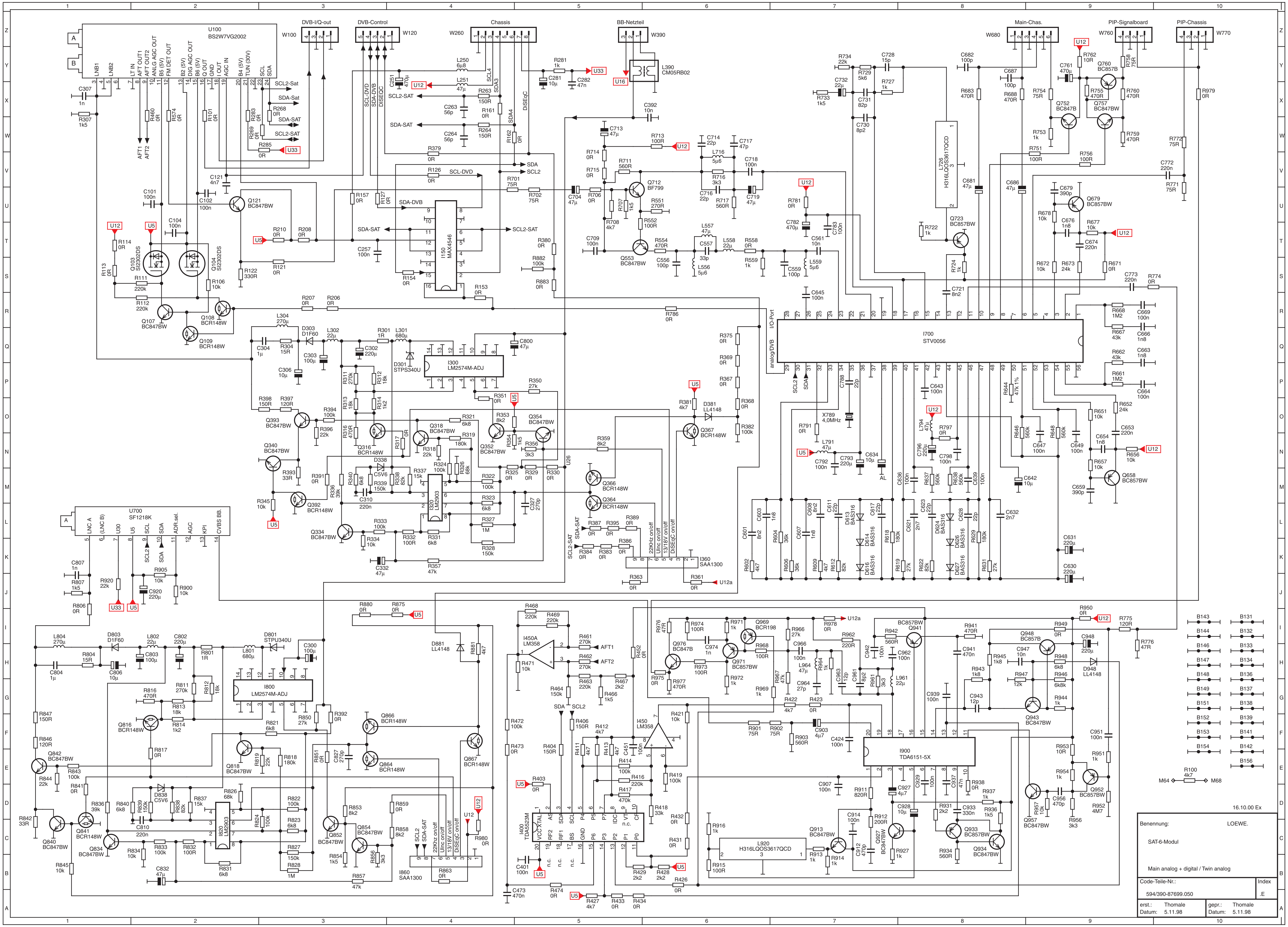
C771

Leiterplatte TVO2 87647E
Bestückungsseite

TVO2 P.C.B. 87647E
Components Side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DVB-Control
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Main-Chas.
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W760
PIP-Chassis
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AFT OUT1
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DIG AGC OUT
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Q OUT
GND
I OUT
AGC IN
B4 (5V)
TUN (30V)
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SDA-Sat
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Unc on/off
13/18V on/off
DiSEqC on/off
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CE
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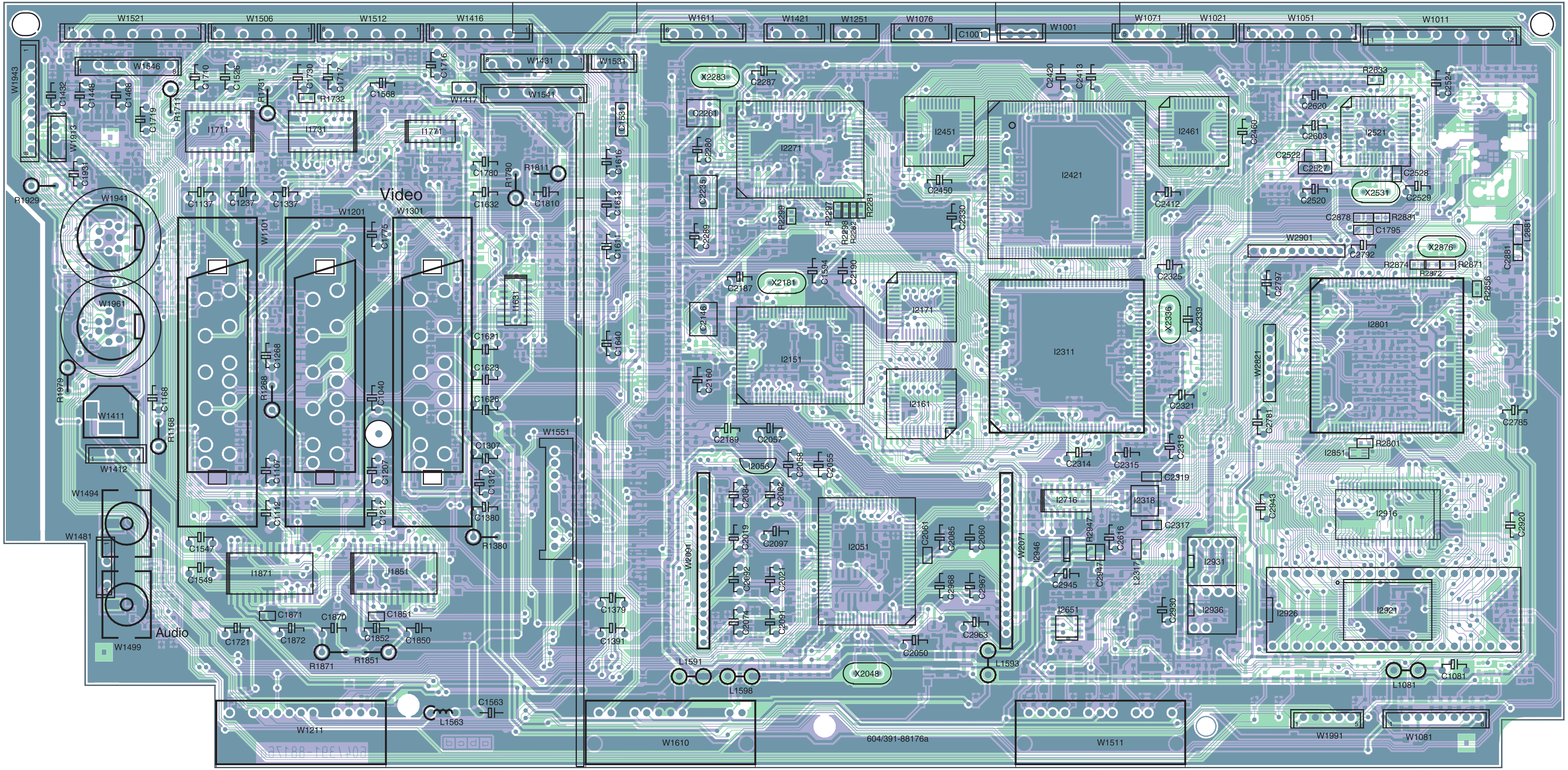
16.10.00 Ex

Benennung:	LOEWE.
SAT-6-Modul	
Main analog + digital / Twin analog	
Code-Teile-Nr.:	Index
594/390-87699.050	.E
erst.: Thomale Datum: 5.11.98	gepr.: Thomale Datum: 5.11.98



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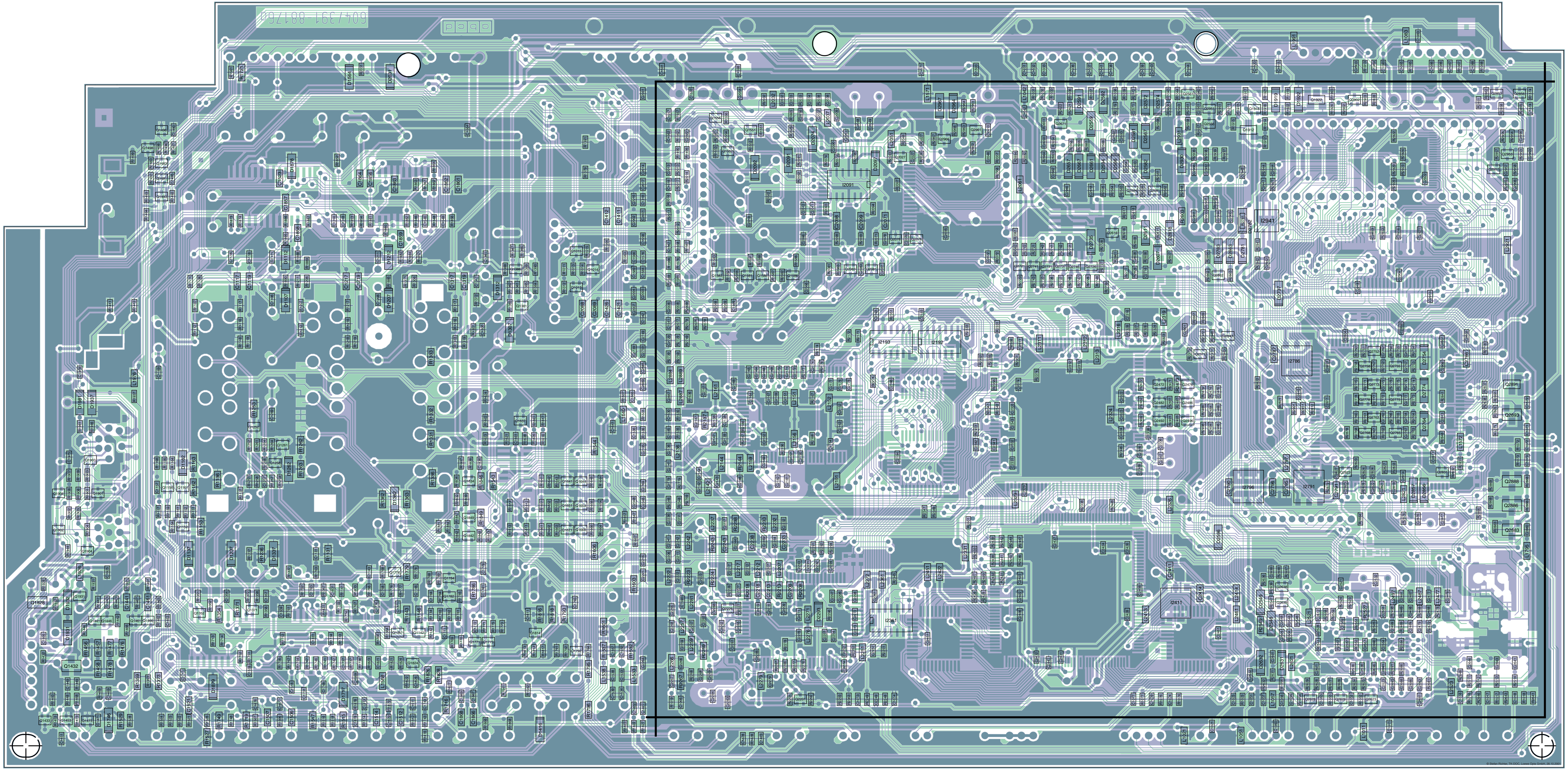
Leiterplatte Signal Board 88176A (Q2500H) Bestückungsseite

Signal Board P.C.B 88176A (Q2500H) Components side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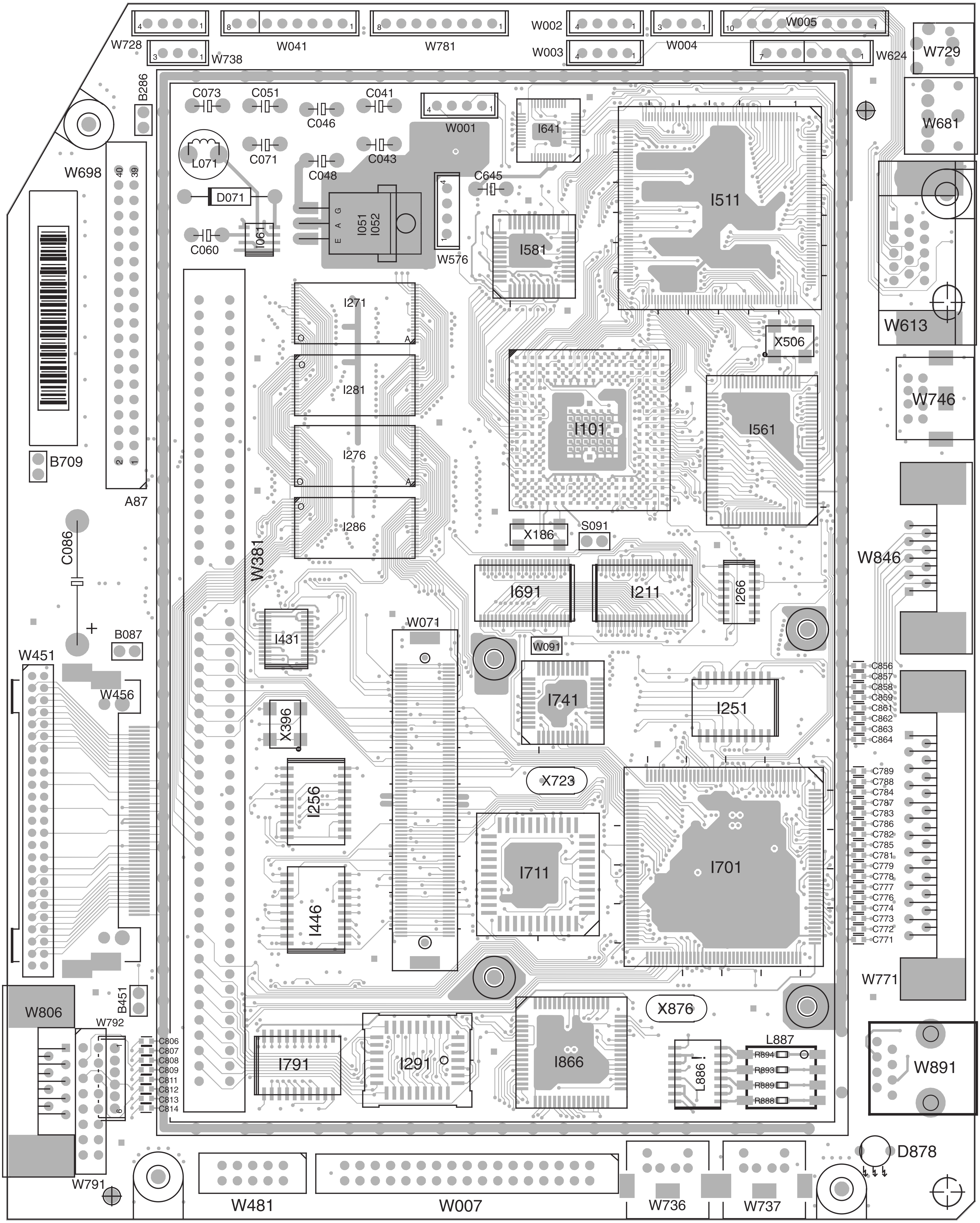
Leiterplatte Signal Board 88176A (Q2500H) Lötseite

Signal Board P.C.B 88176A (Q2500H) Solder side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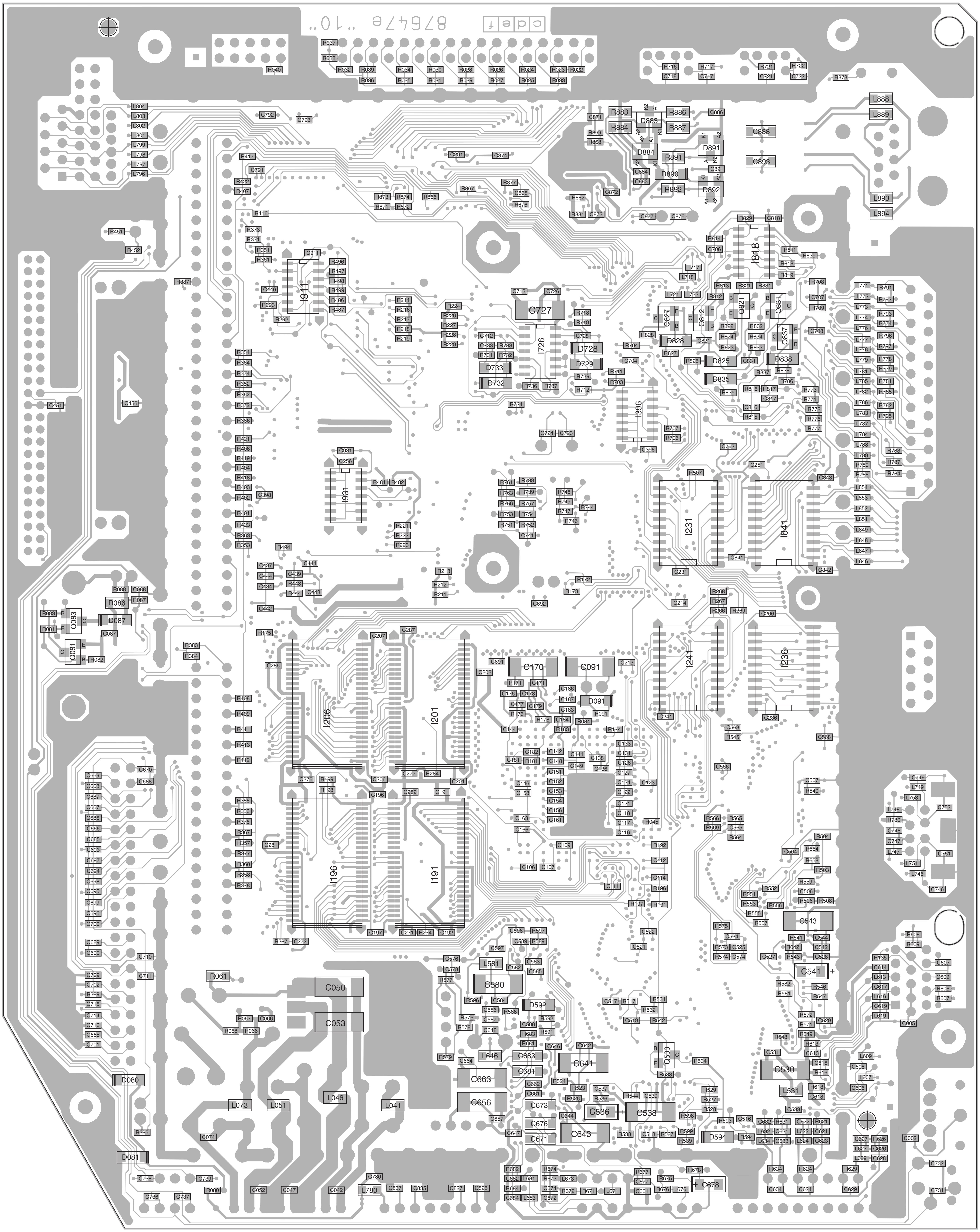
Leiterplatte TVO2 87647E
Bestückungsseite

TVO2 P.C.B. 87647E
Components Side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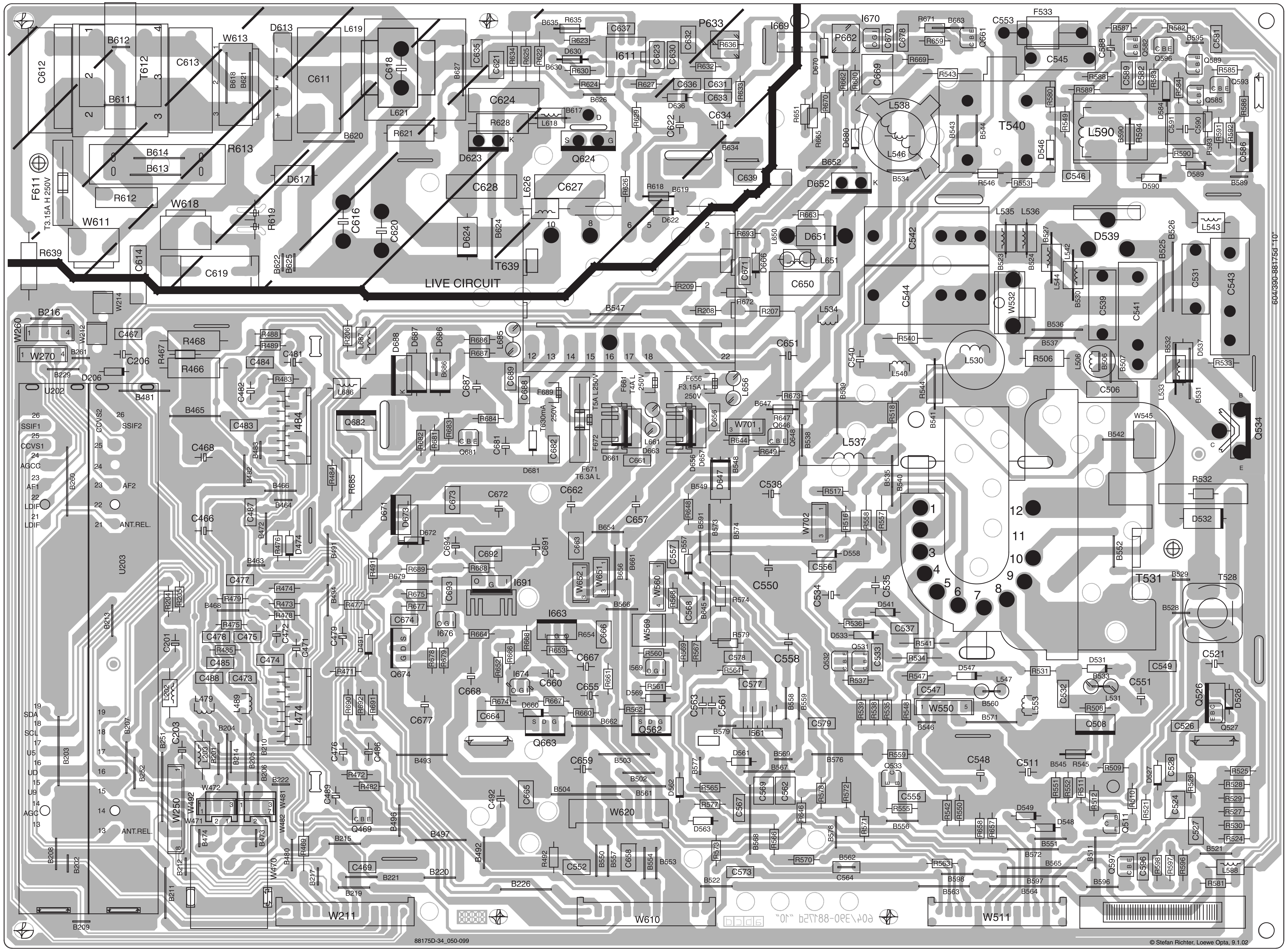
Leiterplatte TVO2   87647E
Lötseite

TVO2 P.C.B. 87647E
Solder Side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R468
P633
P662
I669
I670
F533
F656
F661
F672
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T4A L 250V
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SSIF2
CCVS1
CCVS2
AGCC
AF1
AF2
LDIF
ANT.REL.
SDA
SCL
U5
UD
U9
AGC

88175D-34_050-099

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Technology of Q 2500 colour TV set

LOEWE.

231-90415.917

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1 Introduction

The Q 2500 chassis is a further development of the tried and tested 100 Hz Q 2400 chassis. The modular design, dimensions and layout have been retained.

In order to improve picture performance even further, several circuit components have either been modified or newly added. For sound signals, IF processing in the main receiver unit is now entirely digital.

The Q 2500 chassis is available in three different versions, Q 2500/H (High End), Q 2500/M (Medium) and Q 2500/B (Basic). The signal board is different for all three versions. It has different equipment in certain areas owing to the different power spectrum of the three versions. All H/M and B signal board versions are electrically interchangeable. Due to the incorporation of 2 or 3 AV sockets (the back of the TV set does not fit) they are not mechanically compatible. Except for the signal board there is no differentiation with respect to all other components for the different versions – High End, Medium and Basic. The Q 2500 chassis therefore supersedes the Q 2400 and Q 4140 chassis completely.

Because of this concept it is now possible to fit a DVB upgrade kit to all 100 Hz TV sets – from the Contur to the Aconda. So far this has only been possible for sets with the Q 2400 chassis and not for sets with the Q 4140 chassis.

The following features have been retained from the previous chassis:

- 8 bit digital signal processing
- ACP (Automatic Channel Programming) for fully automatic programming of stations and sorting of cable and SAT reception, including an update function.
- child protection security-plus with secret code.
- - Sharpness control, photo CD circuit and comb filter (S-PAL).
- SCS (Sharpness Control System) for a picture-dependent velocity modulation of the horizontal (line) sweep.
- DTI Plus (Digital Transient Improvement) for colour edge sharpening.
- 576-line still picture
- Adjustable noise suppression DNC (Digital Noise Control)
- Suppression of interline flicker DLC (Digital Lineflicker Control).
- Digital Line Interpolation (DLI) for full frame picture display for PALplus and also in all zoom modes.
- Digital Motion Interpolation (DMI) ensures continuous movement over all single frame pictures.
- Automatic Movie Detection (AMD) for switching to wide screen format in PAL standard on 16:9 units.
- Automatic PALplus recognition and format switching for 16:9 units.
- Digital Scene Control (DSC) for improved grey scales.
- Various switching modes (4:3, Cinema, Zoom, 16:9 and Panorama Mode for 16:9 units).
- Automatic Volume Control (AVC) for adjusting the volume between different channels and during commercial breaks
- On the front: Headphone output and input with S terminals and three cinch sockets.

- Copy function for re-recording between different inputs and outputs (also in standby mode), and during TV programmes.
- Internal clock synchronized with Teletext.
- EPG function (electronic programme guide).
- Recording timer for video recorder and SAT standby function.
- Operation of Loewe video recorders via the menu.
- Switch-off automation and timer.
- In 81 cm sets a rotary panel is used in order to compensate for the earth's magnetic field. This prevents distortion of the picture no matter where the set is placed.
- Personal Control System (PCS): operation tailored to individual customer requirements. The most frequently used functions may be assigned to four buttons of the remote control. Additionally, the operating manual may be viewed on the screen – On Screen Display (OSD). This includes help instructions on functions currently used, information on the remote control functions and an index, which enables immediate implementation of functions. It is also possible to set limitations to the scope of operation according to customer requirements. The user may, for example, be prevented from making changes to particular settings.
- Automatic Gain Control (AGC) for all video signals shown in the main picture.
- The RGB signals are no longer converted to analogue Y/C signals but are directly digitised instead.
- An Audio-In socket to which, for example, an external digital radio receiver may be connected.
- Some models, e.g. Aconda, may be upgraded
- A Dolby Digital Module can be installed in model versions H and M.
- The EAROM and the DVB software may be directly written to via an external V 24 service interface using a PC and service adapter.

The following features are completely new:

- Depending on version, either two or three AV sockets.
- Depending on version, a Teletext memory with 3000 pages (with active EPG function 2000 pages).
- An own radio menu, accessible over the “speaker symbol“ on the remote control.
- Improved Digital Movie Mode (DMM). Feature films are recognized safely. Therefore, accidental switching to camera mode is prevented. Switching effects do not occur anymore.

The following circuit descriptions have been subdivided according to the individual modules. Deviation from this scheme occurs occasionally in order to emphasize relations between circuits more effectively. All component positions in the circuit diagrams are identified by four figures. For the signal board the fully equipped version H is explained. For versions M and B only the differences are noted.

The upgrade kits are explained in a separate circuit description.

1.1 Foundations of 100 Hz technology

1.1.1 Prerequisites for 100 Hz

In order to double the picture frequency at the receiver, the signals have to be read into the relevant memory blocks and then read out twice at double rate.

The following prerequisites must be met:

- The signals need to be digitised.
- The memory modules require at least 3 Mbits storage capacity.
- The software must be able to run a controller, which in turn monitors the read-in and read-out functioning of the memory.
- Suitable frequency-stabilized oscillators for generating the clock frequency must be provided.
- The drive signals for the output stages, line and field deflection, and the E/W correction must also be at double frequency.
- The power output stages for deflection, as well as the deflector itself, need to be designed for the higher frequency and the resulting higher currents.
- The RGB output stages need to be able to process the doubled bandwidth.

1.1.2 100 Hz display modes

When examining display modes the deflection raster and the video raster need to be considered together. In 50 hz operation, the two single-frame pictures A and B are written to the scanning system ‘a’ and ‘b’, i.e. every second line of frame A and the intermediate lines of B. This is achieved in that the flyback of ‘a’ begins in the middle of a line. Trace ‘b’ starts also in the middle of a line but is written to the end of a complete line. The next trace ‘a’ starts again at the beginning of a line. The trace time, however, is always the same.

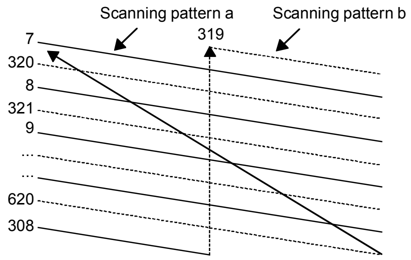
1.1.3 Mode AABB

The simplest case of 100 hz operation involves a simple doubling of single-frame picture display, i.e. field A is displayed twice consecutively followed by field B (AABB).

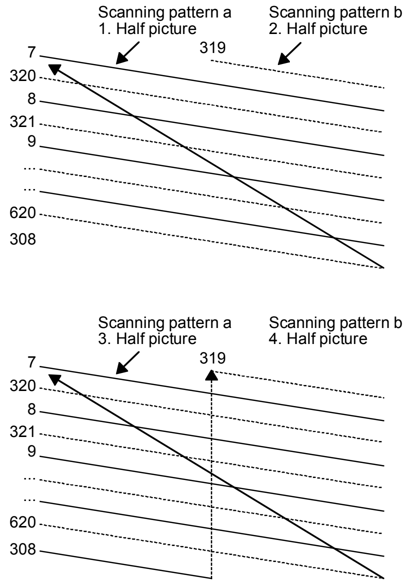
To achieve this the deflection raster must be modified so that ‚a’ is written twice followed by ‘b’ (aabb). Theoretically, this can be accomplished in two ways. Firstly, by adjusting the flyback’s starting time for the 4 single frames. A half-line more is written for ‘a1’ and a half-line less in for the third field. In practice, such a scheme would be quite difficult to implement. In comparison, the second possibility is easier to achieve. This involves shifting the 2nd and 3rd fields (a2 and b1). This can be accomplished by adjusting the current though the deflector by modifying the base resistance. This produces the same time interval for all traces over all fields

Deflection 100Hz

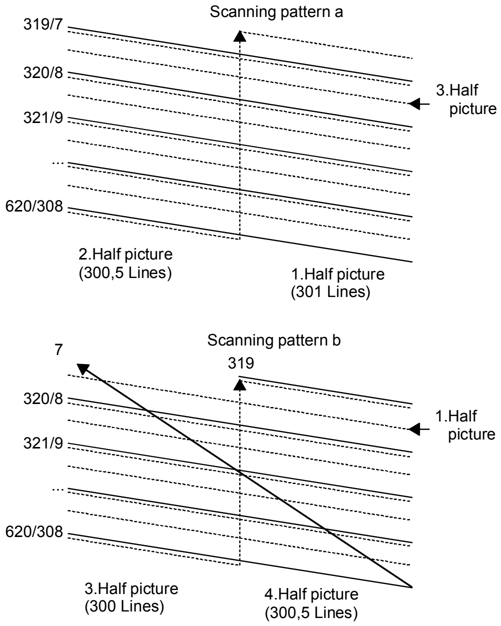
1. 50Hz


Scanning pattern a
Scanning pattern b
319
7
320
8
321
9
...
...
620
308

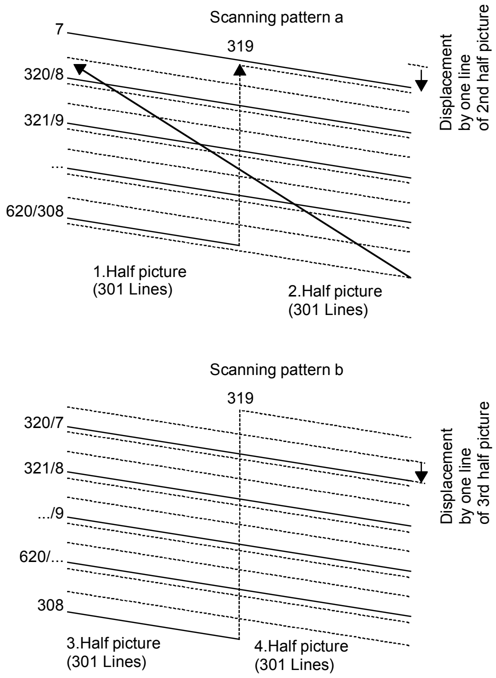
2.100Hz
Scanning pattern a-b-a-b


Scanning pattern a
1. Half picture
Scanning pattern b
2. Half picture
319
7
320
8
321
9
...
...
620
308
Scanning pattern a
3. Half picture
Scanning pattern b
4. Half picture
319
7
320
8
321
9
...
...
620
308

3a 100Hz
Scanning pattern a-a-b-b


Scanning pattern a
319/7
320/8
321/9
...
620/308
3.Half picture
2.Half picture
(300,5 Lines)
1.Half picture
(301 Lines)
Scanning pattern b
7
319
320/8
321/9
...
620/308
1.Half picture
3.Half picture
(300 Lines)
4.Half picture
(300,5 Lines)

3b 100Hz
Scanning pattern a-a-b-b


Scanning pattern a
7
319
320/8
321/9
...
620/308
Displacement by one line of 2nd half picture
1.Half picture
(301 Lines)
2.Half picture
(301 Lines)
Scanning pattern b
319
320/7
321/8
.../9
620/...
308
Displacement by one line of 3rd half picture
3.Half picture
(301 Lines)
4.Half picture
(301 Lines)

For AA and BB display, delay lines must ensure that the lines of the 1st and 2nd, and 3rd and 4th fields contain the same picture information when superimposed on one another. This mode of display allows for very effective reduction of large-area flicker. A reduction of interline flicker is, however, not possible, because intermediate lines are only traced after 20ms.

1.1.4 Mode ABAB

This mode, together with the two described below, are only possible in conjunction with a second single-frame picture memory because of the alternating display of A and B. The deflection must also operate in ‘abab’ raster form. In this display mode, the signals are not modified during deflection or image processing operations. In this case, both interline flicker and large area-flicker can be reduced. However, jerking effects in moving images can arise. This form of display is only suitable for signals where an image is formed from two fields between which there is no relative movement. This mode is therefore of interest only for “Photo CD” or cinema scope films in PALplus.

Reduction of interline flicker without movement interpolation (DLC)

Memory 1	Memory 1 retarded	Memory 2	Output	Deflection Scanning pattern
A	A^v	B	A	a
A	A^v	A	A'	b
B	B^v	A	B'	a
B	B^v	B	B	b
A	A^v	B	A	a

1.1.5 Mode AA’B’B

In this display mode two single-frame pictures, A’ and B’, are calculated. By using an interpolation filter the current single-frame, the current single-frame delayed by one line and the signal delayed by one single-frame are compared with one another. If deviations are detected in one of the signals, this signal is eliminated and the values that agree in the other two signals are retained. If all three signals vary, an average is formed.

Interpolation example

Memory 1	10	10	10	x x x
Memory 1 retarded	10	10	9	x x x
Memory 2	10	8	8	x x x
Output	10	10	9	x x x

The deflection proceeds as sweep ‘abab’. The calculated A’ and B’ are written to shifted scanning system of the 2nd and 3rd single frames. A and B are written to the non-shifted system of frames 1 and 4.

This mode is suitable for the display of horizontal motion between frames. Only small jerking effects arise between movements.

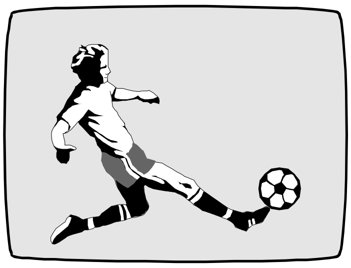
The mode is used to suppress interline flicker in normal TV operation.

1.1.6 Mode AA*BB*

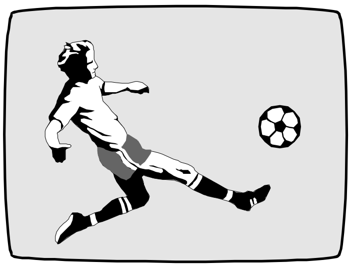
In this display mode with respect to the calculated frames A* and B*, the movement between the original frames A and B, and between B and the next A are taken into account. This movement interpolation (DMI – Digital Motion Interpolation) takes into account both horizontal and vertical movements which cover several lines. This means that when suppressing interline flicker, continuous movement over all frames is achieved.
For full frame pictures (films) it is also assured that no movement between two single-frame pictures takes place (DMM – Digital Movie Mode).

In this display mode the deflection is also ‘abab’.

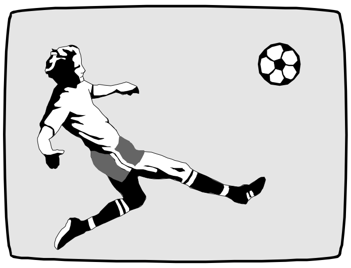
Movement interpolation



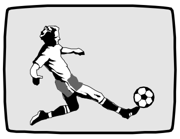
Pcture 1



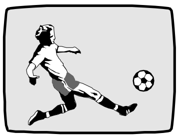
Picture 2



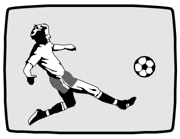
Picture 3



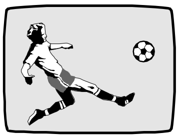
Picture 1



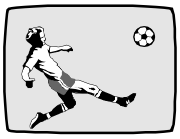
Picture 1*



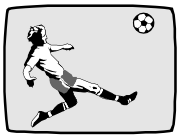
Picture 2



Picture 2*



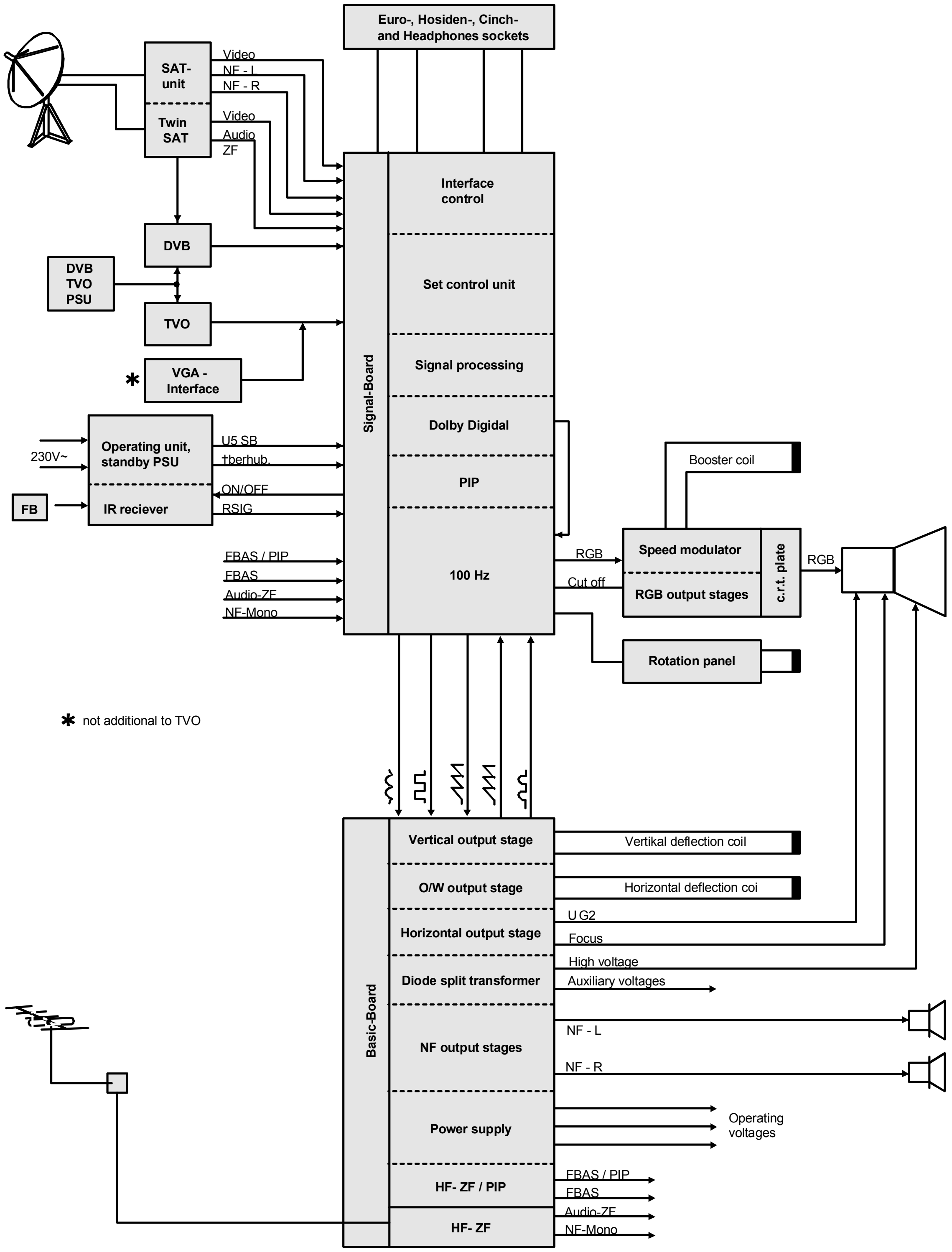
Picture 3



Picture 3*

Display mode 100Hz

No.	Picture change frequency	Video scanning pattern	Deflection scanning pattern	Mode	Advantages
1.	50Hz	A-B	a-b		
2.	100Hz	A-A-B-B	a-a-b-b	DLC off	-Reduction of large area shimmer
3.	100Hz	A-B-A-B	a-b-a-b	-Photo CD on -PAL plus Cinema Scope	-Reduction of large area shimmer -Reduction of interline shimmer in full picture setup
4.	100Hz	A-A´-B´-B	abab	DLC on	-Reduction of large area shimmer -Reduction of interline shimmer in full picture setup with movement
5.	100Hz	A-A*-B*-B	abab	DMI	-Reduction of large area shimmer -Reduction of interline shimmer in full picture setup with movement -Movement interpolation


Euro-, Hosiden-, Cinch- and Headphones sockets
SAT- unit
Twin SAT
Video
NF - L
NF - R
Video
Audio
ZF
DVB
DVB TVO PSU
TVO
VGA - Interface
*
Operating unit, standby PSU
IR reciever
230V~
FB
U5 SB
†berhub.
ON/OFF
RSIG
FBAS / PIP
FBAS
Audio-ZF
NF-Mono
Signal-Board
Interface control
Set control unit
Signal processing
Dolby Digidal
PIP
100 Hz
Booster coil
RGB
Cut off
Speed modulator
RGB output stages
c.r.t. plate
RGB
Rotation panel
Basic-Board
Vertical output stage
O/W output stage
Horizontal output stage
Diode split transformer
NF output stages
Power supply
HF- ZF / PIP
HF- ZF
Vertikal deflection coil
Horizontal deflection coi
U G2
Focus
High voltage
Auxiliary voltages
NF - L
NF - R
Operating voltages
FBAS / PIP
FBAS
Audio-ZF
NF-Mono

* not additional to TVO

2 Basic board

This main heading covers the analogue stages from the power supply circuit through the power output stages to beam current limitation, irrespective of whether or not they are contained on the basic board. In order to maintain consistency, several smaller stages on the basic board are also described.

2.1 Standby power supply

The Q 2500 receiver once again contains a standby power supply circuit, thus limiting current consumption in this mode to < 2 Watt.

The use of a new CCU SDA 6000 on the signal board increases the standby power consumption from 1 W to 2 W, compared to the older model. To meet the requirements of increased power consumption, there is now a small, blocking oscillator type power supply attached to the operating control, which supplies the U5 SB.

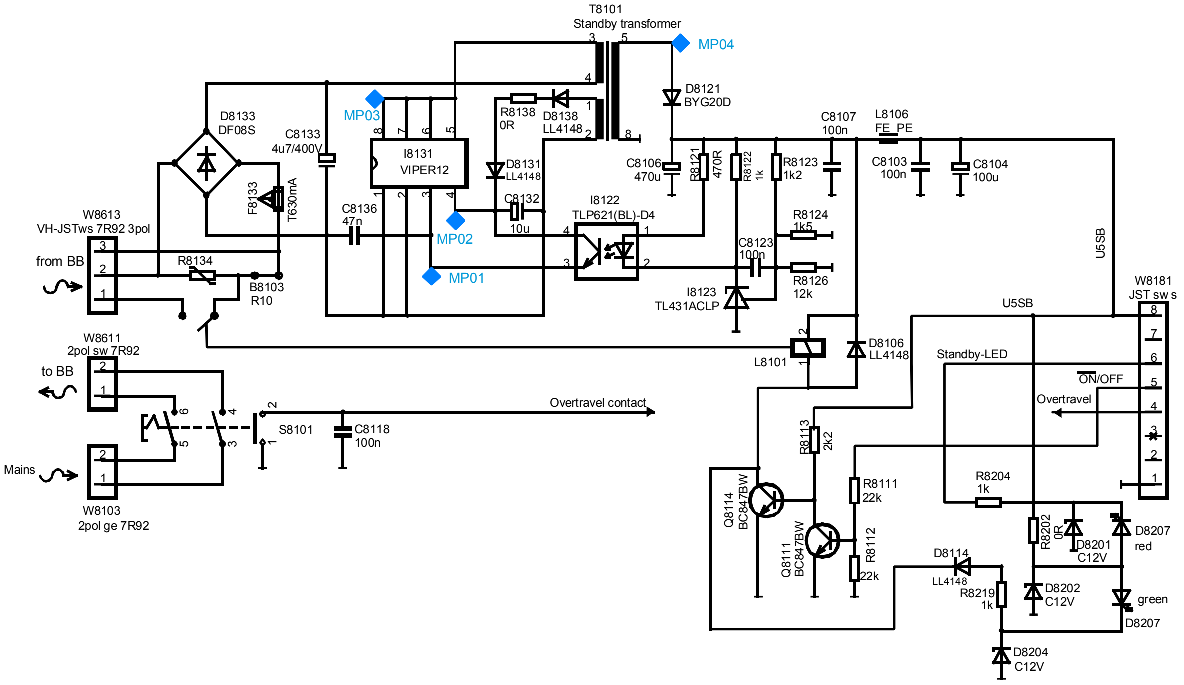
Siemens Corporation has announced a new index of the SDA 6000, that needs only 1 W power in standby operation. This will be implemented on the signal board, but the standby power supply will not be changed.

The circuit itself is mounted together with the IR receiver and the LEDs on its printed circuit board. It supplies the U5 SB, which maintains functioning of the IR detector, the processor circuit and the operating software. The last two circuits operate in standby mode, i.e. the clock frequency is reduced internally so that only those stages required to recognize a switch-on command are maintained in operation. Because of the NexTView function with U 3.3 the TV RAM is retained in self refresh mode. All of this contributes to the standby mode's low power consumption.

2.1.1 Standby power supply circuit

The main voltage is fed via W 8103 the switch S 8101 and W 8611 to the basic board and continues via the line filter (C 612, T612,C 613) and the 3-pole pin connector W613/BB back to pin 2/3 of operating control W 8613. The 220V is rectified by the bridge rectifier D 8133 and smoothed by C 8133. The blocking oscillator type power supply consists essentially of the control circuit I 8131, in which the switching transistor for the primary blocking oscillator winding is integrated, the transformer T 8101 and the opto-coupler I 8122. An operating voltage of about 18V is led from winding T 8101 pin1/2 via D 8138/D 8131 and C 8132 to I 8131 on pin 4. Control input I 8131 pin 3 is supplied with secondary side current control information by opto-coupler I8122. This control circuit stabilises the secondary side output voltage derived from the winding pin 5/8 of T 8101 at 5V. This is then fed via W 8181 pin 8 to the signal board. I8122 is fitted with an internal excess temperature, excess current and excess voltage switch protection. The blocking oscillator type power supply operates at a switching frequency of about 50 kHz.

Q2500 Operating Control


T8101
Standby transformer
MP04
D8121
BYG20D
D8133
DF08S
C8133
4u7/400V
MP03
R8138
0R
D8138
LL4148
I8131
VIPER12
C8107
100n
L8106
FE_PE
C8106
470u
R8121
470R
R8122
1k
R8123
1k2
C8103
100n
C8104
100u
W8613
VH-JSTws 7R92 3pol
from BB
F8133
T630mA
C8136
47n
D8131
LL4148
C8132
10u
I8122
TLP621(BL)-D4
R8124
1k5
MP02
R8134
B8103
R10
MP01
C8123
100n
R8126
12k
I8123
TL431ACLP
U5SB
W8181
JST sw s
W8611
2pol sw 7R92
to BB
L8101
D8106
LL4148
Standby-LED
ON/OFF
Overtravel
Overtravel contact
S8101
C8118
100n
Mains
W8103
2pol ge 7R92
R8113
2k2
R8111
22k
R8204
1k
Q8114
BC847BW
Q8111
BC847BW
R8112
22k
D8114
LL4148
R8219
1k
R8202
0R
D8201
C12V
D8207
red
D8202
C12V
green
D8207
D8204
C12V

The rectified secondary voltage is applied to pin 2 of the relay winding L 8101. via protective resistor R 106. The cold end is open since Q114 is non-conducting and the receiver is in standby mode. This is indicated by illumination of the red LED.
Transistor Q 8114 is blocked, if the working contact is open, the device is in standby, which is indicated by illumination of the red LED.

If the processor receives an ON command from the infrared detector it sets its appropriate switch output to low level. This is then fed to the base of Q 8111 via pin 5 in plug W 8181 which is blocked. Via R 813, U5 SB makes transistor Q 8114 switch. The cold end of the relay coil is earthed, the working contact is closed and the main voltage flows to the main power supply circuit via pin 1 of W 8613, thereby switching the receiver on.

2.2 Blocking oscillator type power supply

The voltage supply in the Q 2400 chassis is drawn once again from a free-running blocking oscillator type power supply. TDA 4605 is used as the control and regulating circuit. In terms of its function, this IC resembles the well-known TDA 4601.

It has, however, a different type of output stage. The 4605 is designed to control a field effect transistor.

This circuit uses a BUZ 91 MOS-FET as the switching transistor. Since control of field effect transistors requires virtually no current, reducing the need for heat dissipation, it has been possible to eliminate the heat sink in the TDA 4605 control IC and house the circuit in a dual-in-line package.

On the secondary side, BUZ 71 A V-MOS transistors are used to stabilise U3.3, U5 and U12 in order to keep power dissipation to a minimum.

The converter transformer, which also provides the standard VDE power distribution, has a primary working winding and a secondary winding to supply voltage to the IC and to generate a control voltage.

Secondary windings also generate the following voltages:

UB to supply the line output stage

U 25 to supply the line driver stage

U 3.3, U 5 and U 12
predominantly to supply an operating voltage to the digital control

U9 for the interface switching ICs

U8 for the video ICs

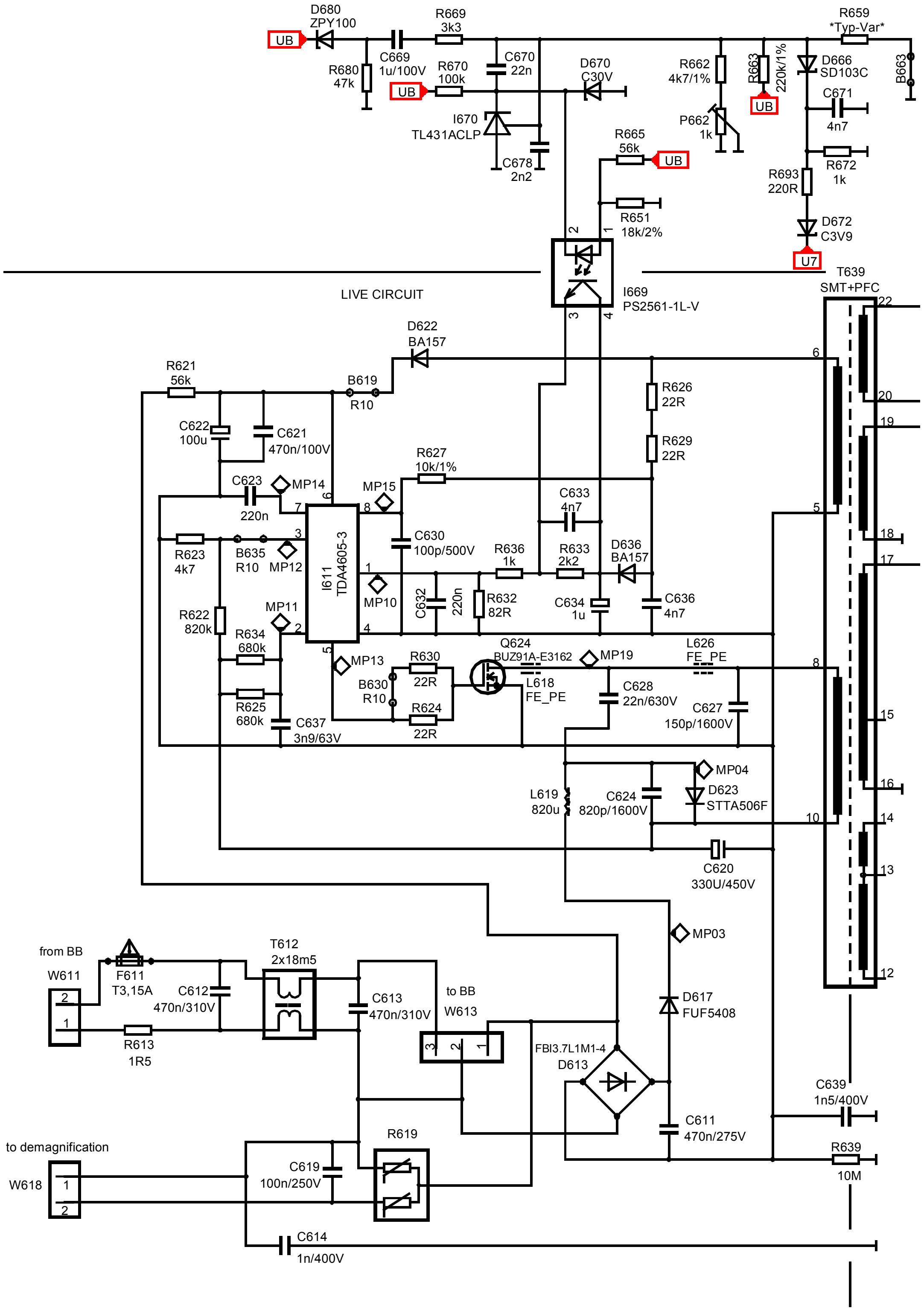
UNF+ and UNF-
used to supply a floating voltage to the VF output stages, approx. ± 18 V

2.2.1 Primary side

The mains voltage flows through the mains power switch, the working contact of the standby relay and the mains RFI suppression filter to the degaussing coil, and via the start-up current limiter R 613 to the bridge rectifier D613.
A voltage of approx. 310 V very rapidly builds up at charging capacitor C 620. This is applied to the drain terminal on the switching transistor via the working winding in the converter transformer.

Since the gate BUZ 91 is not driven at this time, there is no load on the operating voltage.

Q2500 blockingo oscillator type power supply, primary side


UB
D680
ZPY100
R680
47k
C669
1u/100V
R669
3k3
R670
100k
UB
C670
22n
I670
TL431ACLP
C678
2n2
D670
C30V
R665
56k
UB
R651
18k/2%
R662
4k7/1%
P662
1k
R663
220k/1%
UB
R659
Typ-Var
B663
D666
SD103C
C671
4n7
R672
1k
R693
220R
D672
C3V9
U7
I669
PS2561-1L-V
LIVE CIRCUIT
T639
SMT+PFC
D622
BA157
R621
56k
B619
R10
C622
100u
C621
470n/100V
R626
22R
R629
22R
R627
10k/1%
C623
220n
MP14
MP15
C633
4n7
R623
4k7
B635
R10
MP12
I611
TDA4605-3
C630
100p/500V
R636
1k
R633
2k2
D636
BA157
MP10
C632
220n
R632
82R
C634
1u
C636
4n7
R622
820k
MP11
R634
680k
Q624
BUZ91A-E3162
MP19
L626
FE_PE
MP13
R630
22R
B630
R10
L618
FE_PE
C628
22n/630V
C627
150p/1600V
R625
680k
C637
3n9/63V
R624
22R
MP04
L619
820u
C624
820p/1600V
D623
STTA506F
C620
330U/450V
MP03
from BB
W611
F611
T3,15A
C612
470n/310V
R613
1R5
T612
2x18m5
C613
470n/310V
to BB
W613
D617
FUF5408
FBI3.7L1M1-4
D613
C611
470n/275V
C639
1n5/400V
R639
10M
to demagnification
W618
C619
100n/250V
R619
C614
1n/400V
22
20
19
18
17
15
16
14
13
12
6
5
8
10
1
2
3
4
7
9

2.2.2 Start-up

The power supply section is started up by an additional starting circuit. The required voltage is rectified using a diode path in the bridge rectifier. It is fed via resistor R 621 to pin 6 in TDA4605 where capacitor C 622 is then slowly charged. During this charging phase, capacitor C 637 is charged to 6.6 V on pin 2 via an internal IC path. A reference voltage of 1V that is required during the start-up phase and later during normal operation is also generated in the IC.

If the voltage at pin 6 reaches 12 V the IC operates and makes the switching transistor conducting via pin 5. A current flows through both the transformer working winding and the switching transformer drain source path. During this period, magnetic energy is being stored in the transformer. During this conductive phase, a drain current simulator C 637, integrated in the IC, is charged on pin 2. If the internal reference value of 1 V is reached the IC blocks the switching transistor. The magnetic field in the transformer breaks down and this induces voltages in the windings.

The start-up procedure recommences and the system swings/oscillates to normal operation. This is arrived at when a voltage of 400 mV has built up at pin 1.

2.2.3 Normal and control operation

A static state is set in normal operation at constant load. The operating voltage for the IC is drawn from the transformer winding pin 5-6 and rectified with D622. The voltage at pin 6 in the IC is then 11 V. The control input at pin 1 is 400 mV and the duty cycle for the zero passage detector at pin 8 in the IC is set.

The switching transistor is controlled with a fixed frequency of between 20 and 40 kHz, which corresponds to the instantaneous load.

If the load changes, the duty cycle at pin 8 in the IC also changes. The negative edge indicates to the IC when the energy stored in the transformer has been dissipated. If the load increases, this occurs more quickly and the IC reduces the control frequency. If the load decreases, the control frequency increases. This means that load variations between approx. 40 and 260 W and mains voltage fluctuations between 180 and 270 V can be compensated for.

In order to achieve a higher UB voltage stability, regulation on the secondary side is now used which influences the primary circuit's I 669 opto-coupler. The I 669 opto-coupler is controlled via I 670. The control mechanism is influenced via several paths:

- With d.c. voltage via R 663
- Alternating, by coupling to the R 680 diode.
- When not under load, via D 672

The operating voltage is set with the P662 potentiometer. A small resistance here indicates a high value of UB. Correspondingly, a high value of R means a low value for UB.

If UB increases, e.g. due to a smaller load on the line output stage, UB exerts a stronger influence via R 663 at the input of I 670. This results in the I 670 cathode outputting a smaller voltage. The photodiode in I 669 receives more current through R 665. The path between pin 3/4 of I 669 has a lower resistance allowing for a higher voltage on pin 1 of I 611. Component I 611 then regulates output voltage until a value of 400 mV on pin 1 is reached again. If the value of UB becomes lower, then the regulation process is exactly the inverse of that described here.

Via D 680, R 669 and C 669, ripple voltage components are coupled into the regulating circuit. In particular, this branch prevents a low 50 hz ripple voltage arising on UB. With 60 hz signal sources (NTSC, PAL 60 Hz or VGA operation), this would result in humming interference in the picture.

Without secondary-side regulation, e.g. in SAT standby operation, UB would increase to approx. 180 V. In this mode of operation, other voltages (e.g. the bias voltages for the U 5, U 12 branch) do not alter significantly. Stabilization is also guaranteed for these voltages in this mode of operation.

Due to the secondary-side stabilization with UB as stabilization factor, UB without any load would naturally remain constant. In this case, the power supply would regulate down from approx. 180 V (without secondary-side regulation) to the previously set value of UB, typically 146 V. This would also result in all other voltages being reduced. The bias voltages for the stabilized voltages would be too low and they would no longer be stabilized. The digital electronics would search for errors.

In order to prevent this, the regulation acts via U 7. This is accomplished via components D 672, R 693 and 666.

U 7 also drops when the line-output stage is disconnected. When this has reached a value of approx. 6V, the D 666 Schottky diode voltage has also fallen sufficiently for it becomes conducting. A further drop in operating voltage is prevented by the I 670 input. Stabilization of secondary side voltages, e.g. for U 5 and U 12, still operate properly in this mode of operation.

2.2.4 Protective operation

The IC contains a protective circuit to prevent the control frequency from entering ranges where it would otherwise damage the switching transistor during over- and underload. In such cases the system is shut down.

The indicator for this is the voltage on pin 6 in TDA4605. During normal operation this voltage is approx. 11 V. If the load increases, due to a short circuit on the secondary side, for example, the voltage on pin 6 drops. If it drops below 7V, the logic circuit switches off. The same occurs if the voltage on pin 6 exceeds 15 V due to complete discharge or a fault in the control circuit. There is also a second protective circuit to safeguard against overloading. If the current flowing through the working winding in the transformer and therefore also through the switching transistor is so great that the voltage on pin 3 drops below 1 V, the power supply also cuts out.

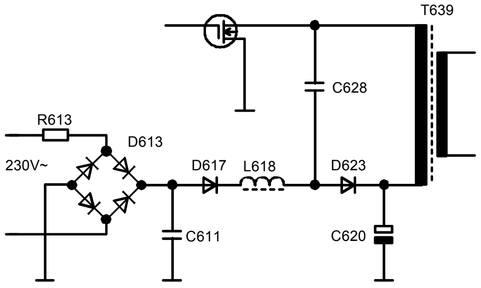
In addition, integrated thermal protection switches the system off at chip temperatures of over 150°.

2.2.5 Power Factor Control

All TV sets with power consumption of more than 75 W, and delivered after 01.01.2001, must be fitted with a Power Factor Control (PFC) circuit.

The circuit power supplies used up to now overlay a pulsed current on the sinusoidal mains alternating voltage. The Power Factor Control circuit ensures current extraction is almost completely sinusoidal. This function is implemented by changing the power supply's input range

Power Factor Control



The alternating voltage from the mains is rectified by the D 613 bridge rectifier. When in resonance, C 620 is loaded to approx. 310 V. Without PFC this means that mains current will only be drawn when the sinusoidal half-wave exceeds 310 V. Sinusoidal current extraction is therefore not guaranteed. With the PFC circuit, C 620 is not directly charged from the mains. Charging of C 620 is via the C 628 current pump. When the Q 624 switching transistor is conducting, C 628 is connected to earth. C 628 is charged via D 617 and L 619. If Q 624 is now switched off, a voltage of approx. 400 V is set on the drain.

The energy stored both in C 628 and in the coil can now charge up C 620 via D 623. C 628 will naturally also be charged when the sinusoidal mains alternating voltage just crosses zero and has a low value.

Q 624 is switched with a frequency between 20 kHz and 40 kHz, depending on load conditions. This also means that C 620 is charged with a current at the same frequency. The current drawn from the mains would also correspond to this frequency, but will be harmonized by the mains input filter.

2.2.6 Secondary side

Although the secondary side voltages are relatively stable, and fast and transient changes in load can be compensated for by the field effect transistor in the primary side, stabilisation of voltages in the digital component is still required.

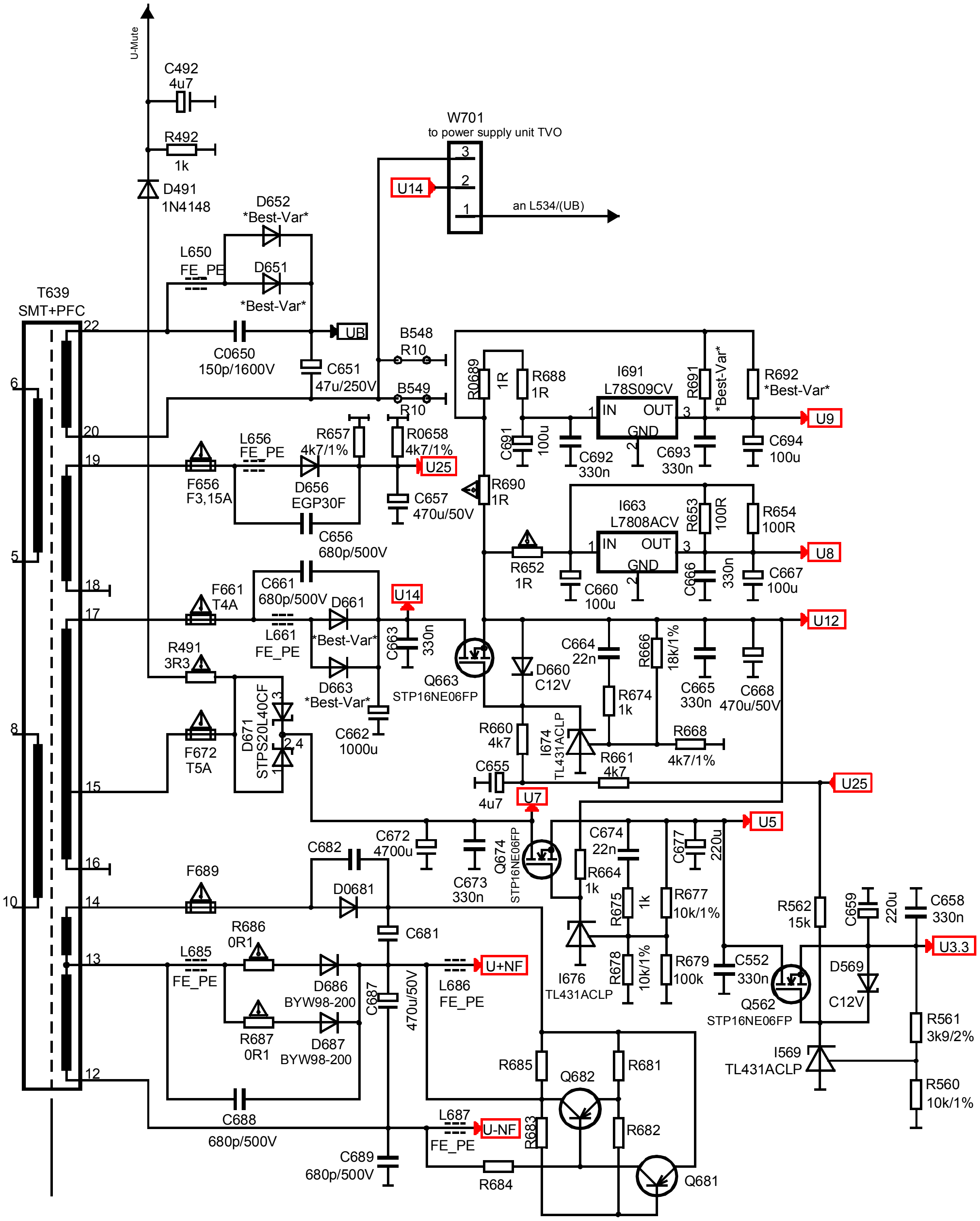
The two secondary voltages U 3.3, U 5, U 8, U 9 and U 12 are stabilised

For the other secondary voltages:

- UB for the horizontal stage
- U 25 for the horizontal driver stage
- UNF+ and UNF- for the VF output stage

Stabilisation is not required, as no current is drawn from these non-controlled levels.

Q2500 blocking oscillator type power supply, secondary side


U-Mute
C492
4u7
R492
1k
D491
1N4148
W701
to power supply unit TVO
3
2
1
U14
an L534/(UB)
D652
Best-Var
L650
FE_PE
D651
Best-Var
T639
SMT+PFC
22
C0650
150p/1600V
UB
C651
47u/250V
B548
R10
B549
R10
6
20
19
L656
FE_PE
R657
4k7/1%
R0658
4k7/1%
U25
F656
F3,15A
D656
EGP30F
C657
470u/50V
C656
680p/500V
5
18
17
F661
T4A
C661
680p/500V
L661
FE_PE
D661
Best-Var
D663
Best-Var
U14
C663
330n
Q663
STP16NE06FP
R491
3R3
D671
STPS20L40CF
3
2
4
1
C662
1000u
8
F672
T5A
15
R0689
1R
R688
1R
I691
L78S09CV
IN
OUT
GND
C691
100u
C692
330n
C693
330n
R691
Best-Var
R692
Best-Var
U9
C694
100u
R690
1R
I663
L7808ACV
R653
100R
R654
100R
R652
1R
C660
100u
C666
330n
U8
C667
100u
U12
D660
C12V
C664
22n
R666
18k/1%
C665
330n
C668
470u/50V
R674
1k
R660
4k7
I674
TL431ACLP
R661
4k7
R668
4k7/1%
C655
4u7
U7
U25
C682
C672
4700u
C673
330n
Q674
STP16NE06FP
C674
22n
R664
1k
C677
220u
U5
16
10
F689
14
D0681
C681
R675
1k
R677
10k/1%
R562
15k
C659
220u
C658
330n
13
L685
FE_PE
R686
0R1
D686
BYW98-200
C687
470u/50V
L686
FE_PE
U+NF
I676
TL431ACLP
R678
10k/1%
R679
100k
C552
330n
Q562
STP16NE06FP
D569
C12V
U3.3
R687
0R1
D687
BYW98-200
R685
Q682
R681
I569
TL431ACLP
R561
3k9/2%
R560
10k/1%
12
C688
680p/500V
L687
FE_PE
U-NF
R683
R682
C689
680p/500V
R684
Q681

2.2.7 Voltage stabilisation

For each of the operating voltages U 3.3, U 5 and U 12 a V-MOS transistor is used as a horizontal controller for stabilisation. Their gate voltages are kept constant by the connected IC's I 569 for 3.3 V, I 676 for 5 V and I 674 for 12 V. In addition, their control input is connected to the voltage distributor by the respective output voltage.

If the output voltage falls under high load, the IC's become high resistant causing the gate voltage to increase and the horizontal controllers are controlled upwards further, whereupon the output voltage increases again. If the load decreases the opposite occurs.

In addition, voltages U8 for the video control and U9 for the interface with the fixed voltage controllers L 7808 and. L 78S09 are stabilised. The controllers I 663 and I 691 are now also located in the power supply. The input voltage is U 12.

2.2.8 Voltage increase

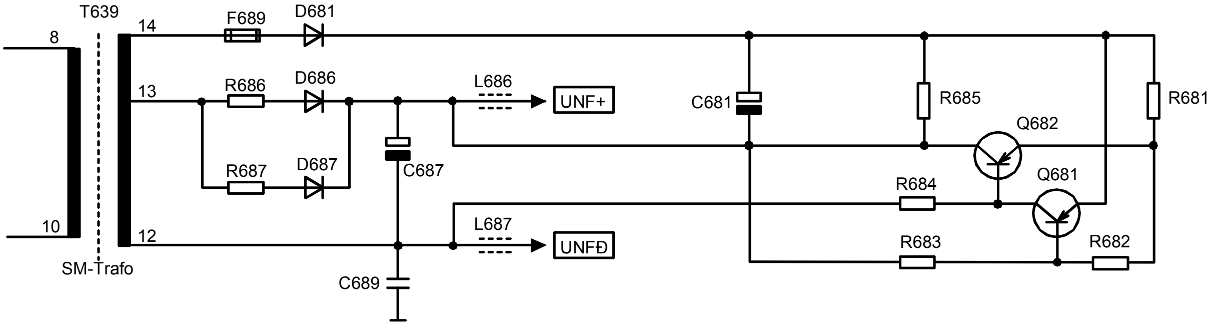
To avoid overloading the VF output phases, they are supplied with a load-dependent operating voltage. The control range of the circuit for this lies between ±18 V in no-load operation and ±13 V at full load.

The pulses taken from pin 14 of the transformer are rectified by D 681 and applied to the emitter connections of transistors Q 682 and Q681. For no-load or low-load operation no voltage is felt across current measurement resistor R 681. This means that Q 681 is blocked and Q 682 is switched through to its base with L level via R 684. The voltage from pin 14 of the transformer increases the VF operating voltage to +18 V.

If the noise level is increased, more current is drawn accordingly. There is a corresponding voltage drop across R 681, which means the base of Q 681 goes more negative, the transistor switches and as a consequence with base Q 682 going positive, a greater or lesser degree of blocking is achieved. The VF operating voltage is reduced accordingly.

Harmonic distortion is therefore kept low. thus preventing overheating of the output ICs. In this way a noise-level dependent video pumping can be prevented.

Voltage increase for VF



2.2.9 Servicing information

For repairs and fault-finding in the power supply unit the following should be noted:

Always connect the unit via an isolation transformer, especially when fault finding the primary side.

The load on C 620 remains active long after the unit has been switched off. Discharge the load if necessary via a low-resistance resistor.

Operation of the power supply unit without the digital unit is possible. For this pin 5 on pin connector W 8181 is connected to earth, but not until a voltage is applied to the standby power supply. For specific failures, this test can also be done with an integrated digital component.

A check of the horizontal output stage cannot be made by withdrawing the deflection plug. For this test L 534 must be unsoldered. An extra load is not required.

A separate test of the power supply unit function without interference from the chassis can be achieved by unsoldering one side of the secondary side rectifier diodes. The rectifier branch for the UB (D 651) and U7 (671) must be available. The UB can then be loaded with a 100 Watt LED.

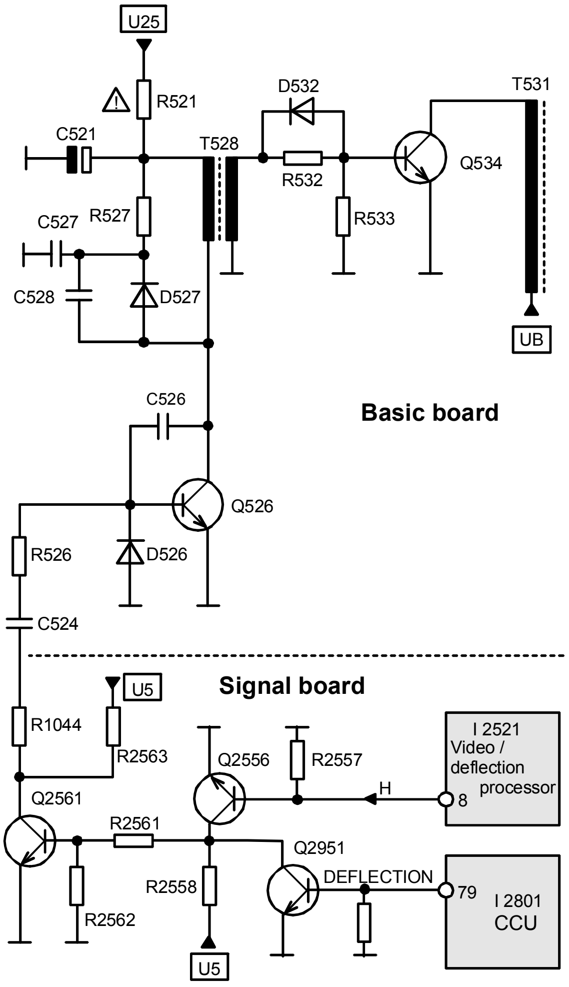
U 7 and UB are necessary for power supply control, so do not deactivate them.

2.3 Horizontal deflection and high voltage production

On the 100 Hz Chassis Q 2500 the horizontal driver, horizontal output stage and high voltage production are essentially the same as the predecessor.

2.3.1 Horizontal driver

The horizontal driver stage is controlled from I 2521 on the signal board via pin 13 from connector W 1511. The pulse at this point is 2.5 Vss.


U25
R521
D532
T531
C521
T528
R532
Q534
C527
R527
R533
C528
D527
UB
C526
Basic board
Q526
R526
D526
C524
U5
Signal board
R1044
R2563
Q2556
R2557
I 2521
Video /
deflection
processor
H
8
Q2561
R2561
Q2951
DEFLECTION
79
I 2801
CCU
R2558
R2562
U5

Capacitive control via C 524 prevents driver stage Q 526 being held conductive continuously if components are faulty or there are no control pulses. Diode D 526 enables rapid discharge of C 524, if Q 526 is controlled in the blocking phase.

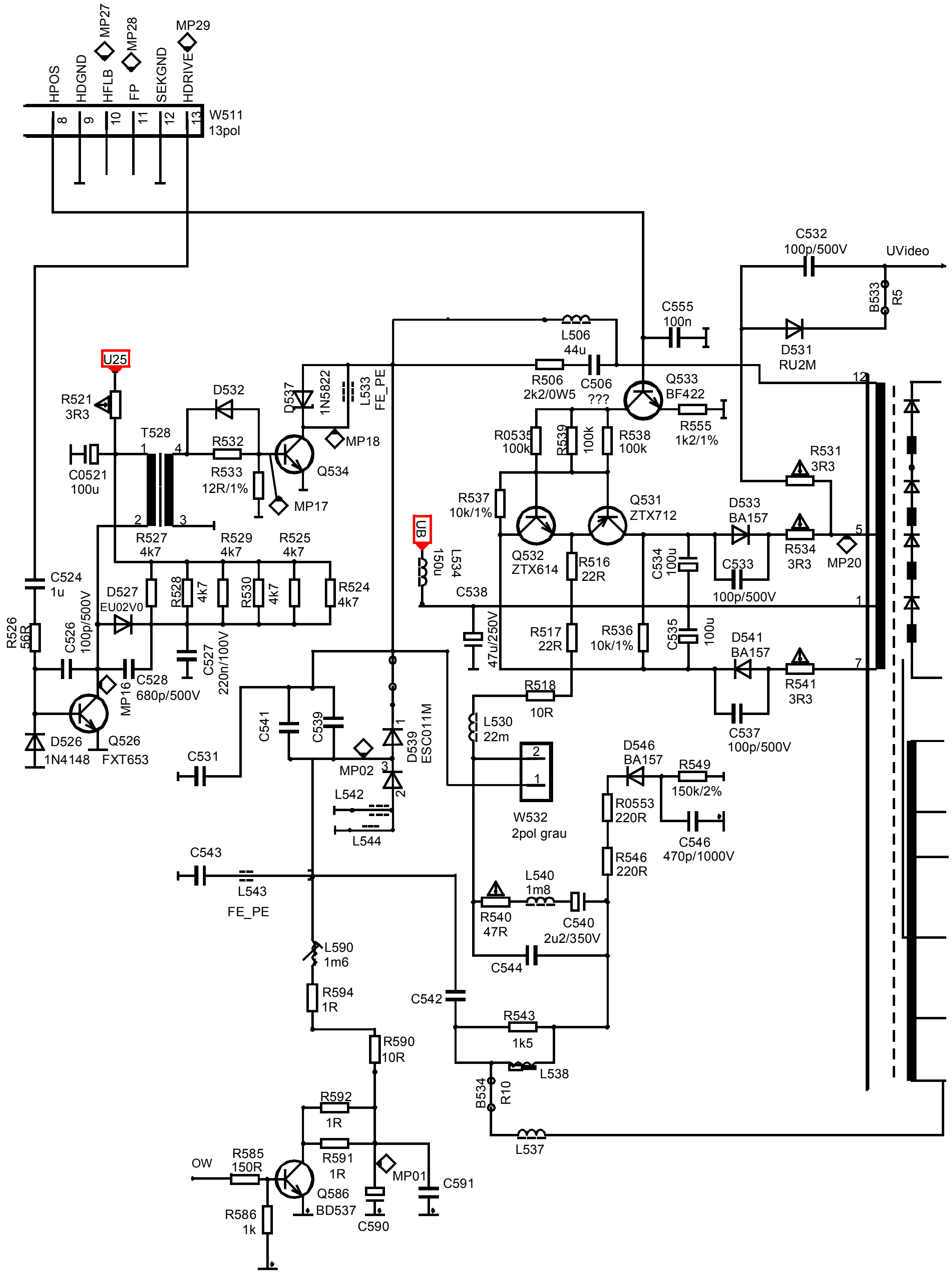
It can be clearly determined from the line driver circuit, as from the control of the line output stage, that this is a case of low-resistance current control. The driver stage is equipped with a transistor, which supplies for the drive transformer T 528 (conversion ratio 7:1) output stage the required base control current of up to 0.9 Ass. To limit inductive switching peaks an R/C combination is connected, a.c. to earth, to the collector of Q 526 after diode D 527. The driver stage operates with respect to the output stage in alternating operation, i.e. if Q 526 is conducting, then Q 534 is blocked and vice versa.

2.4 Horizontal output stage

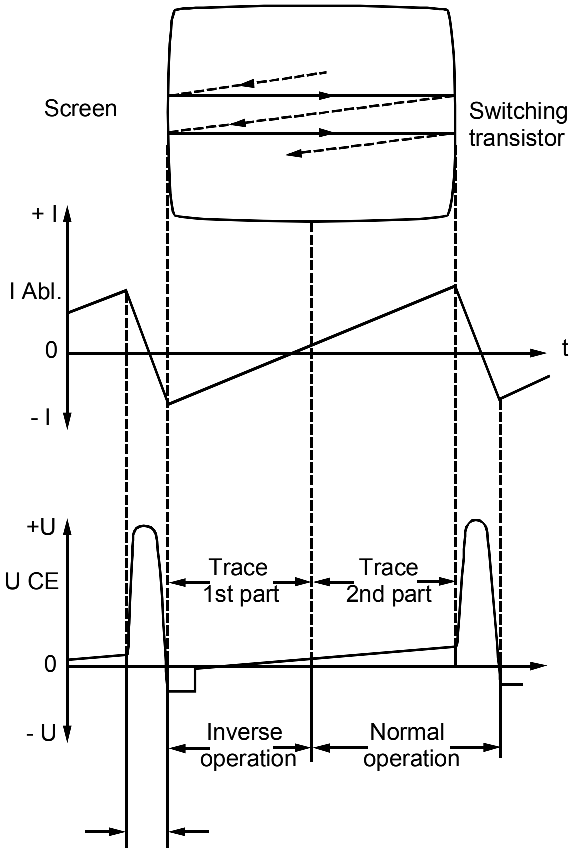
As mentioned in the previous section control of the horizontal output stage, or more precisely the horizontal switching transistor, alternates according to the switching regulator principle. Essentially the base resistance consists of R 532 and the series secondary winding of the driver transformer T 528. The parallel arranged resistor R 533 dampens switching peaks arising in the inductivity.

An additional anti-parallel diode from collector Q 534 to earth, which was used as a booster diode in earlier forms of thyristor deflection switching, is not required, as in this switching concept the collector-base route of the switching transistor Q 534 fulfils the function of the booster diode by a process of inverse operation. In practice the parallel O/W-modulation diodes cause a perceptible load reduction of the switching transistor. The drawing below shows that this inverse operation of the transistor occurs during the first half of the trace, until about the middle of the line. In the second half of the run the transistor operates as normal with conducting base-emitter diode. Only during the relatively short flyback time is the switching transistor blocked. The low resistance base switching already described enables the base peak current between +0.9 A and –0.9 A in both directions to be dissipated quickly.

Q2500 horizontal output stage


HPOS
HDGND
HFLB
MP27
FP
MP28
SEKGND
HDRIVE
MP29
8
9
10
11
12
13
W511
13pol
C532
100p/500V
UVideo
B533
R5
C555
100n
D531
RU2M
L506
44u
R506
2k2/0W5
C506
???
Q533
BF422
R555
1k2/1%
12
U25
R521
3R3
D532
D537
1N5822
L533
FE_PE
T528
1
4
2
3
R532
R533
12R/1%
Q534
MP18
MP17
C0521
100u
R0535
100k
R539
100k
R538
100k
R531
3R3
R537
10k/1%
Q532
ZTX614
Q531
ZTX712
D533
BA157
R534
3R3
MP20
5
R527
4k7
R529
4k7
R525
4k7
UB
L534
150u
C538
R516
22R
C534
100u
C533
100p/500V
1
C524
1u
D527
EU02V0
R528
4k7
R530
4k7
R524
4k7
R526
56R
C526
100p/500V
C528
680p/500V
C527
220n/100V
47u/250V
R517
22R
R536
10k/1%
C535
100u
D541
BA157
R541
3R3
7
MP16
Q526
FXT653
D526
1N4148
C531
C541
C539
D539
ESC011M
1
3
2
MP02
R518
10R
L530
22m
W532
2pol grau
C537
100p/500V
D546
BA157
R549
150k/2%
R0553
220R
C546
470p/1000V
L542
L544
C543
L543
FE_PE
R546
220R
L540
1m8
R540
47R
C540
2u2/350V
C544
L590
1m6
R594
1R
C542
R543
1k5
L538
B534
R10
L537
R590
10R
R592
1R
R591
1R
MP01
C591
OW
R585
150R
R586
1k
Q586
BD537
C590

It is conceivable that the essentially higher emitter currents (IE max. = 4.5 A) will invoke enormous "flooding" of charge carriers in the N-P- and P-N-transitions of the semiconductor. In order to guarantee rapid switching behaviour and to ensure rapid discharge of the charge carriers in the base zone, the base control is correspondingly low resistance.



In this respect it must be mentioned that the control pulses are specially formed for the dual functionality of Q 534 normal and inverse operation. In principle the trace relationship of the base control of 6 µs flyback and 26 µs trace time is changed to 14 µs flyback and 18 µs trace time. In this way it is possible, to process unavoidable production dispersion of the driver transformer. By means of prompt control the switching transistor has sufficient time to prepare for the following operational phase.

The operating voltage of the horizontal output stage is taken from the switch mode power supply and is 146 V for 33“/4:3 and 32“/16:9/RF c.r.t.s, 142V at 21,24,28“/4:3 and 136 V for all other c.r.t.s. The exact control and switching rhythm during a line period corresponds to the principle of the switched resonant circuit. For this the line switching transistor operates via its three operating conditions - conduction, inverse conduction and blocked – in such a way that the charge and discharge procedures of the collector capacity C 531 and inductivity T 531 determine the exact trace and flyback intervals.

Only during the horizontal flyback time is Q 534 blocked for 6 µs. By charging the operating voltage the capacitor of the parallel resonance circuit C 531 forms the positive half wave of a sinusoidal oscillation. C 531 and T 531 are dimensioned in such a way that they create horizontal flyback pulses. The natural desire of a parallel resonance circuit to convert the stored charge in the capacitor into inductance as magnetic energy leads to reversal of polarity of the current.

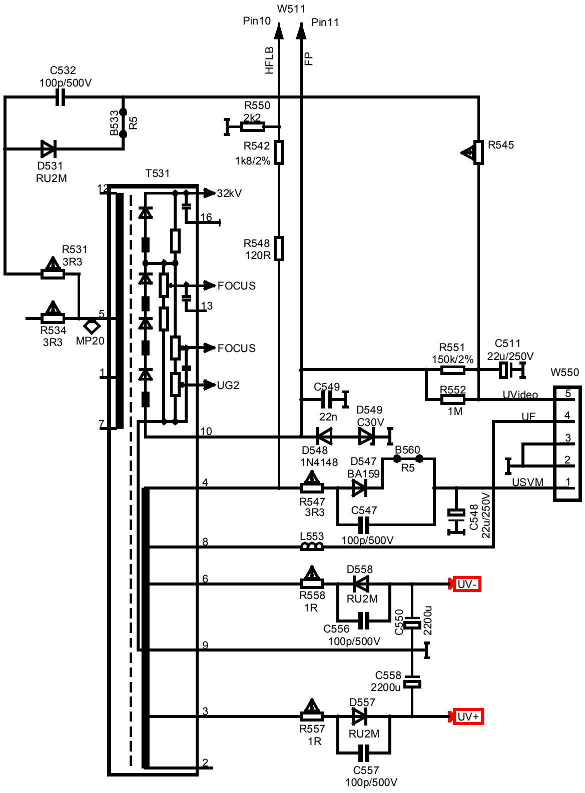
Normally the negative component of the sinosoidal oscillation is felt on the collector of Q 534. This attempt is however prevented by the collector-base diode path of Q 534.

On reaching the start up voltage the diode path becomes conductive and cuts the negative components. In these cases the E/W modulator diodes support this function, whereby in the switching transistor the power dissipation of the transistors is reduced

The horizontal deflection pulses are detached directly from the collector of the switching transistor on the parallel deflection winding. Between the base point of the horizontal deflector and the E/W diode modulator the east/west correction information is coupled in accordance with the dual generator principle. This procedure is almost non-reactive with respect to the primary winding of the high voltage transducer.

2.4.1 High voltage production

Q2500 secondary H output stage


W511
Pin10
Pin11
HFLB
FP
C532
100p/500V
B533
R5
R550
2k2
R542
1k8/2%
R545
D531
RU2M
T531
12
32kV
16
R548
120R
R531
3R3
FOCUS
13
R534
3R3
MP20
5
FOCUS
1
UG2
7
10
R551
150k/2%
C511
22u/250V
W550
C549
22n
R552
1M
UVideo
D549
C30V
UF
5
4
3
2
1
D548
1N4148
D547
BA159
B560
R5
4
R547
3R3
C547
100p/500V
C548
22u/250V
USVM
8
L553
6
D558
RU2M
R558
1R
UV-
C556
100p/500V
C550
2200u
9
C558
2200u
3
D557
R557
1R
RU2M
UV+
C557
100p/500V
2

The high voltage transducer also contains the cascade. The secondary winding of the step up transformer is divided into four and the high voltage rectifier diodes are connected between the individual winding sections. This form of high voltage production is possible without the highly charged capacitors used up to now, which increases the reliability of high voltage production and makes possible a space-saving compact solution.

The resistance voltage divider and the potentiometer of the focus and G2 adjustment is integrated mechanically into the splitting combination for units with 4:3 c.r.t.s.

The filament voltage of the c.r.t. is assigned to pin 9. On pin 4 the flyback pulse for the synchronisation of the control is assigned to pin 4. At the same time this pulse is rectified by D547 and fed to the c.r.t. plate via connector W 549. The 60V occurring here is required by the c.r.t. PCB for the speed modulator. The UV+ and UV- for the vertical stage (approx. ± 13 V) occur in the windings between pin 6 and 9 and pin 3 and 9.

Just like the amplitude of the radiation current a corrective voltage for the stabilisation of the horizontal amplitude can be tapped at the base, connection 10 of the high voltage winding.
This radiation current dependent voltage is led to the signal board via pin 11 of connector W 511. The radiation current fuse and limiter are found here.

The operating voltage U 200 for the video output stage is tapped on the primary side of the pin 5 of the diode split transformer and rectified by D 531. In addition on connection 5 another voltage UB -10 V and on pin 7 a voltage of UB +10 V are produced, which are felt on capacitors C 535 and C 534. On UB = 136 V there are 126 V and 146 V. These voltages are required for the offset correction of the horizontal deflector.

2.4.2 Horizontal- offset deflector

The deflector pulse is formed in such a way that through the deflection and S-correction a linear deflection results. This only functions however when the deflection is exactly central. As the Q 2500 chassis could also be used as a VGA monitor, high demands are placed on linearity. For this reason the possibility of offset correction is created.

A free DAC in I 2271 is used for horizontal offset correction. The d.c. voltage felt on pin 55 can be set in the servicing mode. This is fed via connector W 511 /W 1511, pin 8, to the base of transistor Q 533 on the basic board. Q 533 together with R 555 represents a current source for the push-pull stage Q 531 and Q 532. The operating point for the push-pull stage is set with R 537 and the parallel circuit of R 535/538/539. At rest the operating voltage of the line output stage is applied to the base connections of Q 531/532 and both transistors are blocked.

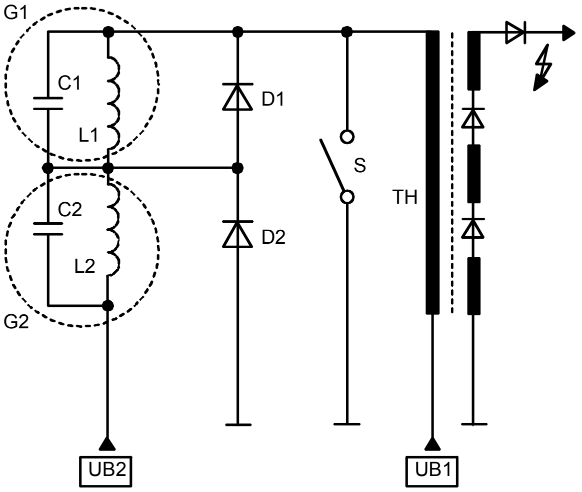
If I 2271 increases the base voltage of transistor Q 533 and this then conducts, the base voltage of the push-pull stage drops and Q 531 conducts. This means the d.c. current is made more negative by resistors R 516, R 517 and R 518 and coil L 530, whereby the deflection shifts to the left.

If, on the other hand, the voltage on pin 27 of I 2271 drops, transistor Q 533 becomes high resistance and the base voltage on the push-pull stage increases. This means Q 532 conducts and L 530 increases the voltage on pin 2 of the deflection coil. This leads to a shifting of the d.c. current component in a positive direction and deflection to the right. Coil L 533 serves as d.c. current coupling for the deflection.

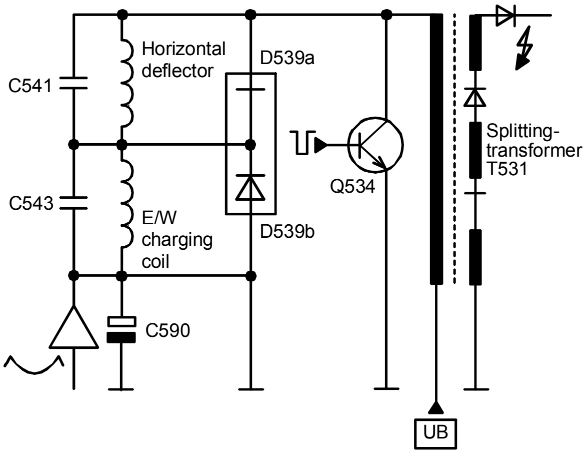
2.5 East/west correction

In order to compensate for the pincushion (distortion) in 110° units in an east/west direction, the horizontal deflection current in the vertical centre must be increased with respect to the vertical start and vertical end. The right degree of correction is achieved by influencing the horizontal deflection current with a vertical frequency parabola in the east/west diode modulator.

Two generators connected to each other by a bridging circuit provide the correction signal for the E/W modulator for the horizontal deflection current.



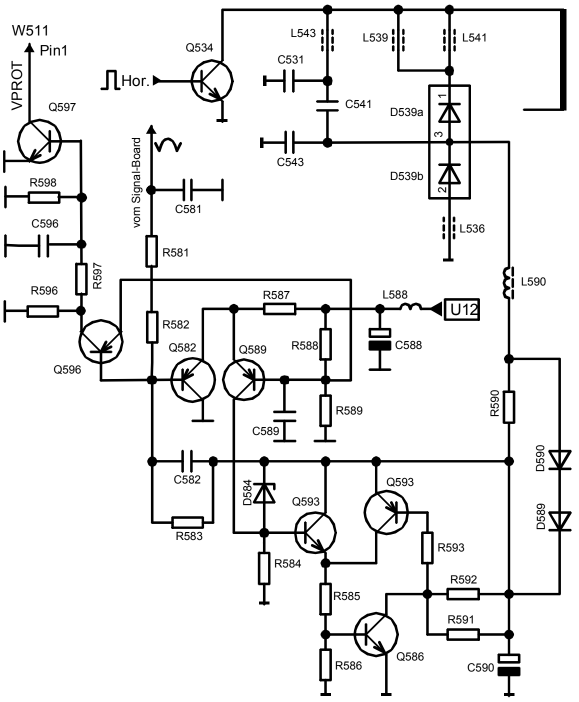
In the above drawing the two generators, G1 = horizontal generator, and G2 = east/west generator, are represented only by their resonant circuits. The deflection current in the deflection coil L1 is supplied by both generators. So that the high voltage is not influenced by the E/W modulator, the voltage on transformer TH is determined only by the horizontal generator G1. Therefore, for correct bridge compensation during the line trace, only E/W modulation of the deflection current takes place in an almost non-reactive fashion on the horizontal output level. For improved clarity the conceptual flow diagram above is shown in the following drawing with the actual component locations.


Horizontal deflector
D539a
C541
Splitting-transformer T531
Q534
C543
E/W charging coil
D539b
C590
UB

2.5.1 Circuit

The components of the east/west output stage, as well as the diode modulator are located on the basic board.

E/W correction


W511
Pin1
VPROT
Q597
Q534
Hor.
L543
C531
C541
L539
L541
D539a
C543
D539b
L536
vom Signal-Board
C581
R598
C596
R581
R597
R596
Q596
R582
Q582
Q589
R587
R588
L588
U12
C588
C589
R589
L590
R590
D590
D589
C582
R583
D584
Q593
Q593
R593
R584
R585
R592
R591
Q586
R586
C590

The video/deflection processor TDA 9332 applies a d.c. underlying parabola type voltage to pin 3. This Information contains all corrections for picture width and east/west. The following amplifier stage, consisting of transistors Q 582 to Q 589, could therefore be implemented simply as a conventionally based differential amplifier.

Control is via low-pass filter R 581, C 581 and R 582 on the base of transistor Q 582. The low-pass filter suppresses any noise components from the pulse width generator in I 2521.
The base of transistor Q 589 is determined by the voltage divider R 588/R 589 in d.c. and thereby determines the operational point of the differential amplifier.

The amplification of the differential amplifier is determined essentially by the relationship of the negative feedback resistance R 583 and the output resistances R 581/582. The parabola type voltage, amplified to 12 V by output stages Q 585 and Q 586, is fed via the E/W charge coil to the diode modulator. Dual diode D 539 superimposes the deflection current on it and the E/W correction is implemented.

Transistor Q 593 was incorporated to protect the output stage transistor Q 586 in the event of the deflection connector being withdrawn. Normally Q 593 acts as positive feedback to Q 586. If the deflection connector is withdrawn the current increases through Q 586 and therefore also through resistors R 591 /R 592. This causes Q 593 to conduct and the power loss in Q 586 to be returned to a normal level. In the event of a fault the two transistors Q 596 and Q 597 ensure that the unit switches to protective operation. Q 596 is conductively controlled by a reduced base voltage. Q 597 conducts and controls VPROT at low level. The CCU protective circuit responds and switches the unit off.

2.6 Vertical output stage

In comparison with earlier models the Q 2500 generation of chassis does not have an a.c. coupled, but a d.c coupled vertical output stage. This has the advantage that the vertical deflection coils can be supplied with current directly and the large coupling capacitor can be dispensed with. This means that vertical correction information can operate directly, without vertical distortions caused by the deflection coil coupling capacitor.

As we know, a positive and a negative deflection current flow through the vertical deflection coils. In order for the d.c. coupled output stage to produce this negative current, it must be supplied with a +/- voltage.

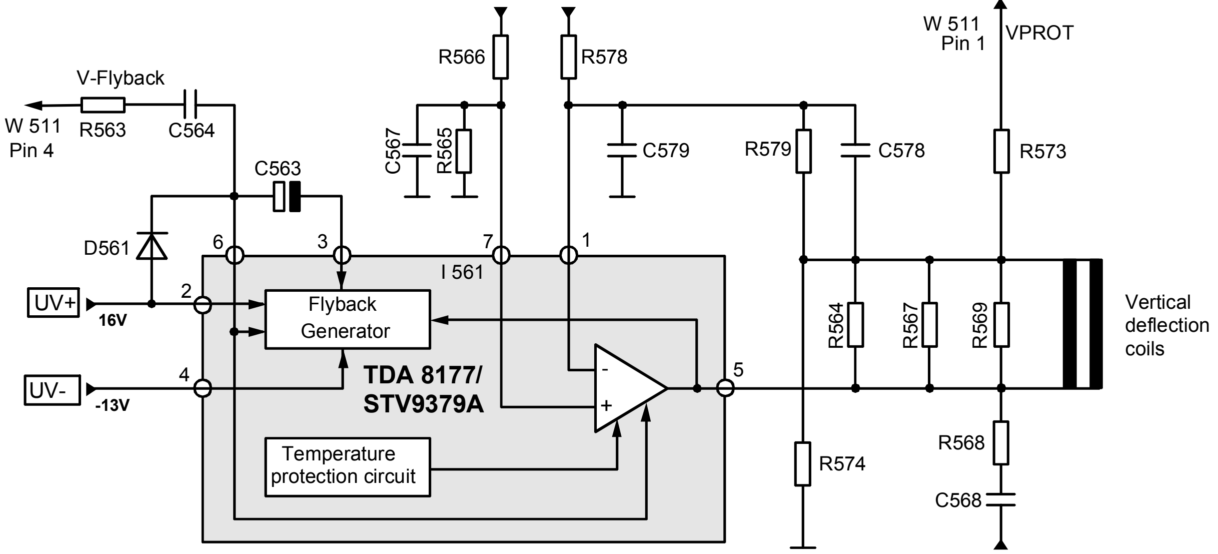
The two possible variants of the vertical output stage IC´s (TDA 8177/STV9379FA) incorporated into the 100 Hz Q 2500 chassis are housed in a Heptawatt plastic housing.

The following functional groups are incorporated into the IC´s as circuit components:

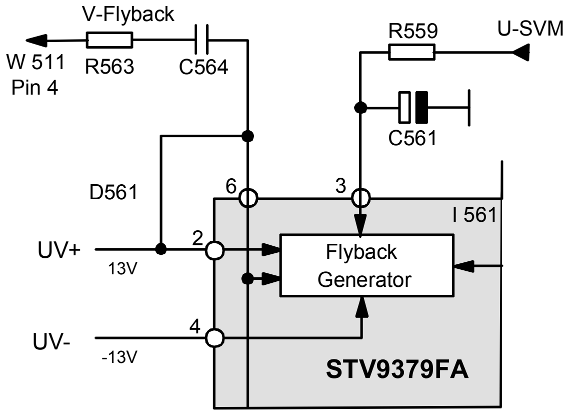
- A power operational amplifier that is able to drive the vertical deflection coils with a peak deflection current up to 3 Ass.
- A flyback generator, that generates the voltage charge for the vertical flyback.
- A temperature protection circuit that limits the deflection current on overload.

The power operational amplifier is controlled symmetrically and inversely on its non-inverting and inverting inputs. Therefore, the video/deflection processor outputs two inversely symmetrical vertical control signals.

Vertical output stage


V+
VÐ
R566
R578
W 511
Pin 1
VPROT
V-Flyback
W 511
Pin 4
R563
C564
C567
R565
C579
R579
C578
R573
C563
D561
6
3
7
1
I 561
UV+
16V
2
Flyback
Generator
R564
R567
R569
Vertical
deflection
coils
UV-
-13V
4
TDA 8177/
STV9379A
5
Temperature
protection circuit
R574
R568
C568

Vertical output stage



These two control signals contain all vertical correction information. This means that output side S correction, which is necessary for a.c. coupled output stages, can be dispensed with completely. The component insert at the output of the V output stage is also considerably reduced. Symmetrical control almost fully suppresses interference that can affect the two V control signals due to the very high common mode rejection ratio of the V-power operating amplifier. The two V control signals V+/V- are applied to the pin connector W 511, pin 2/3 and reach the series resistors R 566 /R 578 via the inputs on pin 1/7 of the V output stage I 561. The sawtooth, which is amplified about 10 times, is output by pin 5 of I 561 and forces the current through the vertical deflection coils.

The R/C combination 568, from the output of pin 5 to earth, prevents the tendency of the output stage to oscillate and protects it from switching peaks that can be caused by the deflection coins. To stabilise the V output stage, part of the sawtooth from the base of the deflection coils is fed back via resistor R 579 to the inverted input pin 1 .

Picture formation is normally established by the d.c. current component of the deflection current. This means that for a d.c. coupled V output stage, by simply changing the d.c. components of the control sawtooth, the d.c. component of the deflection current can be changed, and with it the picture formation.

2.6.1 Flyback generator

The job of the flyback generator is to provide, the switching voltage for the voltage increase during the vertical flyback. The problem with this is as follows:

The energy requirement of the vertical output stage is at its highest during the flyback, as the electron stream has to be directed rapidly from the lower right corner of the screen to the top left corner.

This transitory additional energy requirement is achieved by doubling the operating voltage, which is only available for the vertical output stage. During the vertical trace, the bootstrap capacitor C 563 is charged to approx. 26 V via D 561. The output of the flyback generator at pin 3 of I 561 at this point is UV-/-13 V. At the time of flyback start, the flyback generator is switched by the output stage output at pin 5 and applied to the output at pin 3 UV+/ +13 V. Due to the d.c. shift on the minus pin of capacitor C 563, the operating voltage for the output stage on pin 6 increases by the voltage in C 563. At the same time, D 561 is blocked, which prevents the charge in the power supply leaking away. This means that for rapid flyback there is a transitory +40 V (approx.) operating voltage available.
For many c.r.t. types the flyback pulse is not sufficient to fully return the deflection beam, so that flyback lines are visible.

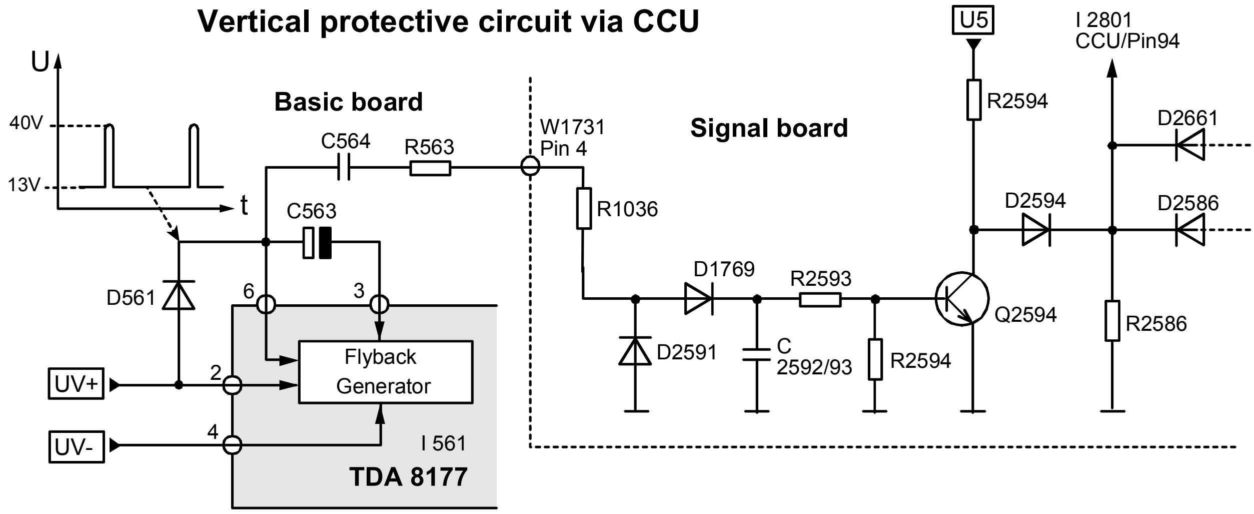
In these devices the V output stage of STV9379FA is used. For the flyback generator this has an independent voltage supply. A USVM/60V is used that is fed to the I 561 via the fused resistor R 559 on pin 3.
If the V output stage is changed during service then ensure it is replaced with the same type. The two IC variants are not compatible.

2.6.2 Vertical protection circuits

Protection circuits are used to protect the c.r.t. against burning if the vertical deflection fails.

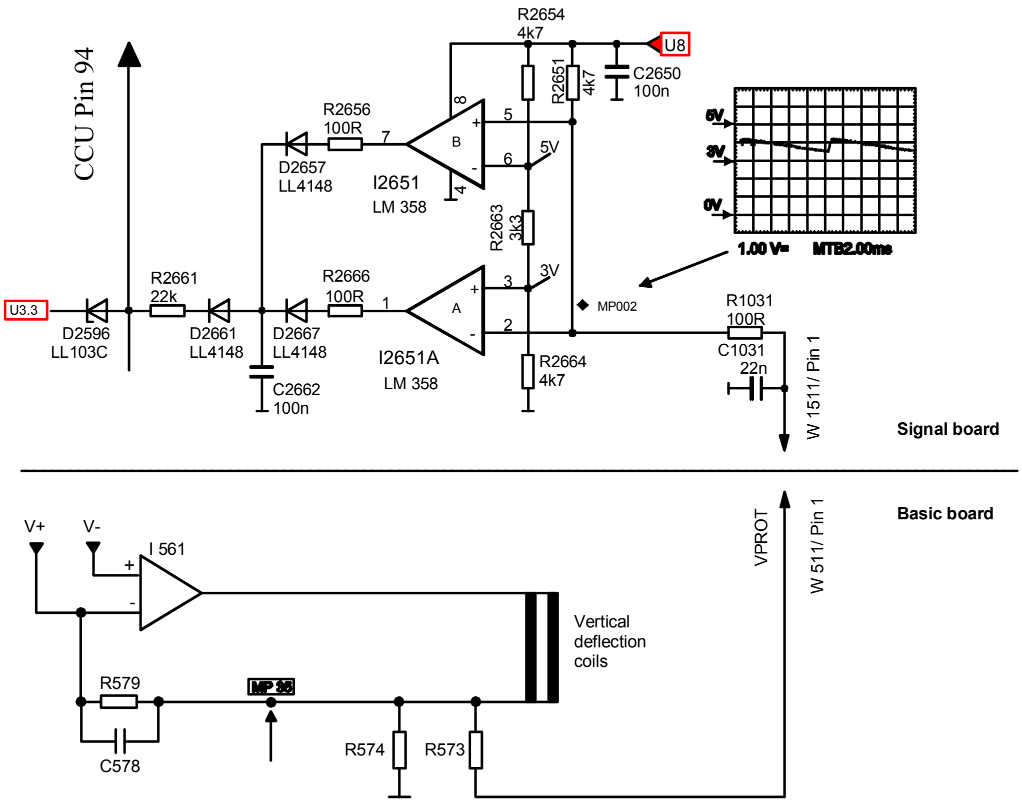
For a d.c. coupled V output stage a fault situation can theoretically occur in which the deflection saw tooth appears to be available, but a faulty d.c. component directs the electron beam to the upper or lower end of the c.r.t. neck. This could cause the c.r.t. neck to melt and lead to destruction of the c.r.t. neck.

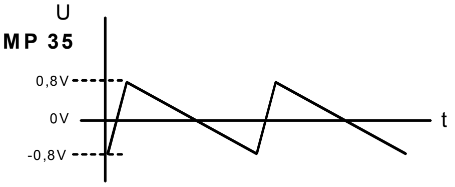
To prevent this a V saw tooth is taken from the base of the V deflection coils with R 573 and a d.c. voltage is applied to the signal board with R 2651.

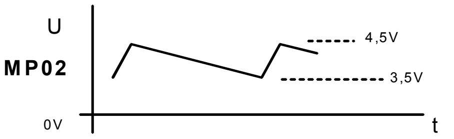

Vertical protective circuit via CCU
U
40V
13V
t
Basic board
C564
R563
W1731
Pin 4
Signal board
C563
R1036
D561
6
3
Flyback
Generator
UV+
2
UV-
4
I 561
TDA 8177
D1769
R2593
D2591
C
2592/93
R2594
Q2594
U5
R2594
I 2801
CCU/Pin94
D2661
D2594
D2586
R2586

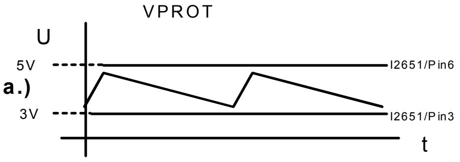
This VPROT signal is fed to the protective circuit that consists of the dual operational amplifier I 2651. Operational amplifier A works on its non-inverting input pin 3, with reference voltage of 3 V and operational amplifier B on its inverting input pin 6 with 5 V. If the VPROT signal - Diagram A – does not fall below or exceed the reference values of 3V and 5 V, then the V deflection and the vertical d.c. component through the deflection coils is correct. If the d.c. component is too positive or too negative - Diagrams B + C – this is interpreted as a fault. If, for example, the d.c. component of the VPROT signal is too small (<3V Diagram C), OP A controls its output on pin 1 to H level. This is fed, via the two D 2667/2661, to CCU pin 94. H level on pin 94 represents a fault and the CCU switches the device within about 2 secs to standby operation. If the d.c.level is too positive (>5V Diagram B) pin 7 goes from OP B to H level and the CCU switches the device off.

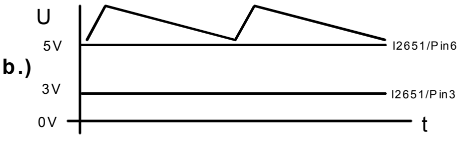
Vertical protective circuit via CCU


CCU Pin 94
U3.3
D2596
LL103C
R2661
22k
D2661
LL4148
D2667
LL4148
C2662
100n
D2657
LL4148
R2656
100R
7
B
8
4
5
6
+
-
I2651
LM 358
R2666
100R
1
A
3
2
I2651A
LM 358
R2654
4k7
R2651
4k7
C2650
100n
U8
5V
R2663
3k3
3V
MP002
R2664
4k7
5V
3V
0V
1.00 V=
MTB2.00ms
R1031
100R
C1031
22n
W 1511/ Pin 1
Signal board
Basic board
VPROT
W 511/ Pin 1
V+
V-
I 561
Vertical
deflection
coils
R579
C578
MP 35
R574
R573

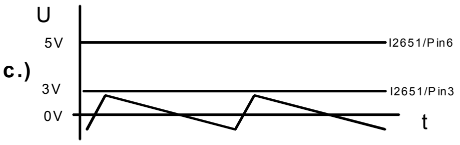






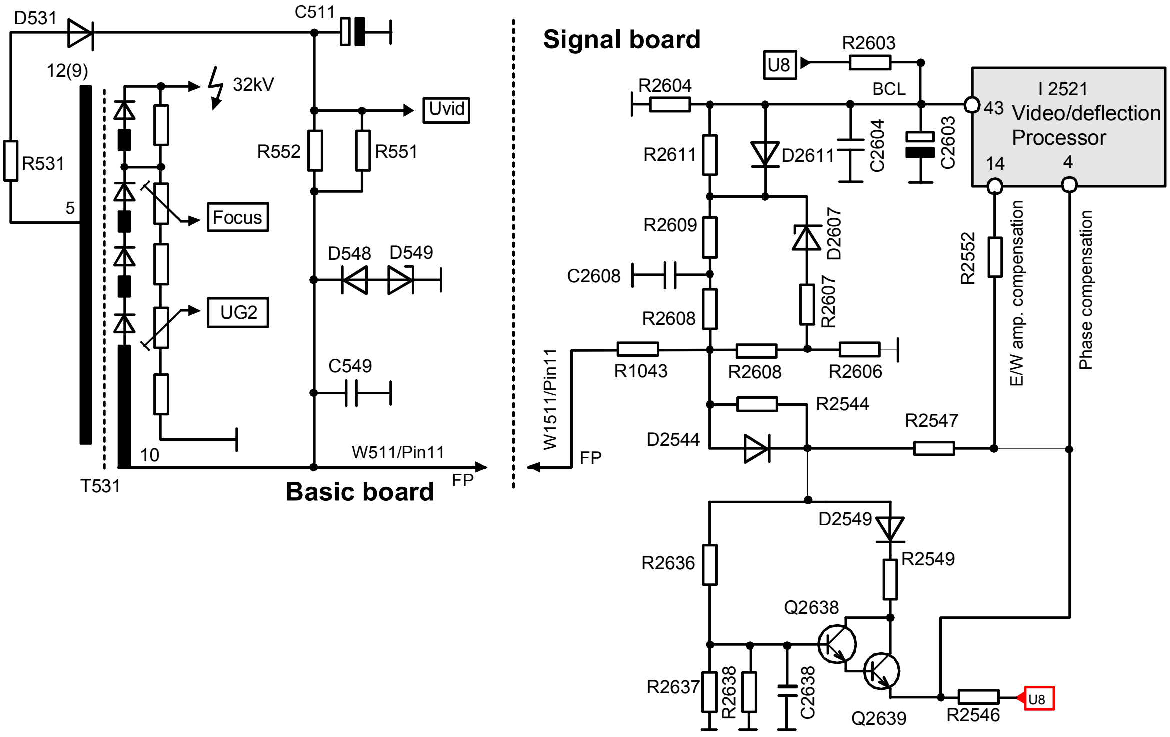


d.c. current component much too positive



d.c. current component much too negative

Beam current limitation


D531
C511
12(9)
32kV
Uvid
R531
R552
R551
5
Focus
D548
D549
UG2
C549
10
W511/Pin11
T531
Basic board
FP
Signal board
U8
R2603
R2604
BCL
I 2521
Video/deflection
Processor
43
14
4
R2611
D2611
C2604
C2603
R2609
D2607
C2608
R2607
R2608
R2552
E/W amp. compensation
Phase compensation
W1511/Pin11
R1043
R2606
R2544
R2547
D2544
FP
D2549
R2636
R2549
Q2638
R2637
R2638
C2638
Q2639
R2546

The second protective switch monitors the V flyback pulse that is fed from I 561 /pin 6 via R 563 to the pin connector W 511 /pin 4. On the signal board this V flyback pulse is rectified by diode D 2591/1769 and integrated with capacitor C 2592/2593. With the voltage available on capacitor C 2992/2593, Q 2594 conducts. The collector of Q 2594 is then at the same potential as L, and diode D 2594 is blocked.

If there is no flyback pulse due the absence of a V output stage, no voltage can build up on capacitors C 2592/2594 and Q 2594 blocks. Pin 94 of the CCU is set to H level via diode D 2594.

If pin 94 of C 161 is set to H level by the absence of a V flyback pulse in the operating condition of the unit, as described, after 2 seconds the CCU switches the device back to standby operation. This permits safe shut down of the device with a faulty deflection controller.

2.7 Beam current limitation

To limit the beam current the Q 2500 chassis is provided with an average value control. The limit switch is integrated into TDA 9332.

The switch to limit the contrast and brightness is controlled with a d.c value via pin 43.

The switch is designed in such a way that for a voltage of >3.3 V there is no limitation on contrast and brightness.
For a voltage between 3.3 and 2.2V the contrast is reduced in proportion to the voltage. If the voltage drops below 1.8 V the brightness as well as the contrast is reduced. At approx. 1 V on pin 15 the brightness and the contrast are reduced by 100%, whereupon the screen is black.

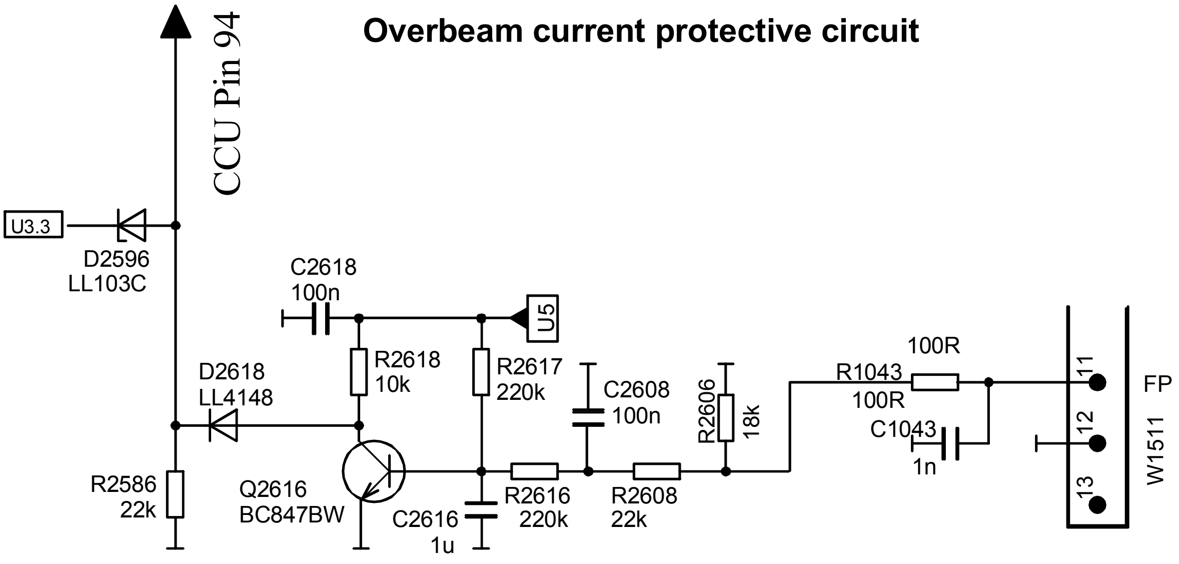
To achieve beam current limitation the base of the diode split transformer influences the d.c. value on pin 43 of TDA 9332. Inversely proportional voltage information on the beam current can be obtained at the base.

In order for the TDA pin to be at >3.3 V with a beam current of zero, the base of the transformer is connected to U 200 via R 551/552. The positive voltage in this operational state is charged via resistors R 2608, R 2609 and R 2611 of Elko C 2603 and on pin 43 of the TDA there is a voltage of >3.3 V; there is no beam current limitation.

As the high voltage winding in the diode split transformer operates with a virtual earth, the base becomes negative with increasing beam current, whereby C 2603 via R 2608, R 2609 and R 2611 can be correspondingly discharged to a greater or lesser degree and the beam current controlled.

Diodes D 2607 and D 2611 are provided so that the circuit can also react to jumps in beam current. They ensure the rapid discharge of C 2603.

In addition, for a 4:3 display in a 16:9 TV set, from pin 113 of I 2311 via Q 2612 and R 2601, the voltage on C 2603 drops. This corrects the beam current limitation for the smaller screen area. (see also signal board deflection).


Overbeam current protective circuit

2.7.1 Overbeam current fuse

In correct operation the beam current measurement input on pin 43 of TDA is at a d.c. level of 2 to 4 V. According to the level, the RGB output amplifier in this IC is controlled to a greater or lesser extent, which ensures that the beam current limitation is implemented.

If the c.r.t. is controlled upwards to the full extent, even though the gain of the amplifier has been fully reduced , which can occur if there is a fault in the RGB output stage or its power supply, then the c.r.t. could be damaged if no protective measures are taken.

To prevent this, transistor Q 2616 is connected to the beam current data. In normal operation the transistor conducts and L level is applied to its collector thus making the circuit inoperative.

If the described fault occurs, the base of the diode split transformer becomes negative due to the high beam current, Q 2616 blocks and due to the 5 V on its collector diode D 2618 conducts.

Pin 94 of the CCU is set to H level and switches the device to standby.

2.7.2 HFLB protective circuit

If the line output stage is too strongly overloaded by a fault, the protective circuits discussed cannot respond in any way. Excessive overloading of the H output stage causes the line flyback pulse to reduce in amplitude. The HFLB pulse on pin 10 of W 1511 is therefore monitored by a protective circuit. In normal operation this pulse has an amplitude of approx. 35 V. Via the 20 V zener diode D 2581 this pulse makes Q 2581 conductive in rhythm with the line frequency. Capacitor C 2584 is switched to earth cyclically with the line frequency via Q 581 and cannot therefore charge up. This means that L level is felt on C 2584l. If a fault in the deflection circuit causes HFLB to fall below 20 V, zener diode D 2581 and Q 2581 block. C 2584 charges to H level. This H level is fed via D 2586 to pin 94 of the CCU, which switches the device back to standby operation.

2.8 Speed modulator

The device is also equipped with a speed modulator. It is located between the RGB outputs of the digital unit and the RGB output stages on the c.r.t. board. It controls the speed of the electron beam in the horizontal direction, which increases picture sharpness and prevents a defocusing effect at high contrast on vertical, very bright areas of the picture.

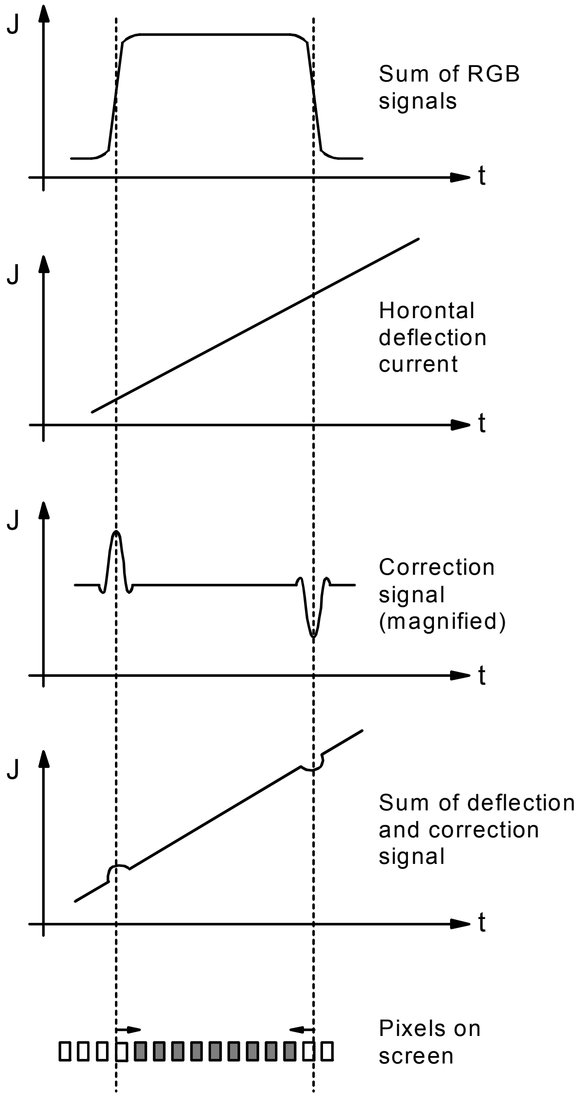
2.8.1 General

The speed modulator evaluates high frequency changes in the picture signal and sends them to an additional winding in the deflector. The resulting magnetic field overlays the normal field produced by the deflection winding. By this method, the deflection speed is adapted to the picture content, which leads to a definite improvement in picture sharpness.

A picture change in a positive or negative direction produces a signal, as shown in the following drawing and thereby supplies the additional winding in the deflector.

The amplitude of the signal and the modulation level of the contrast are therefore dependent on the setting and the slope of the signal change.

One could also modulate the deflection current directly, which would however, be more expensive than the second winding.

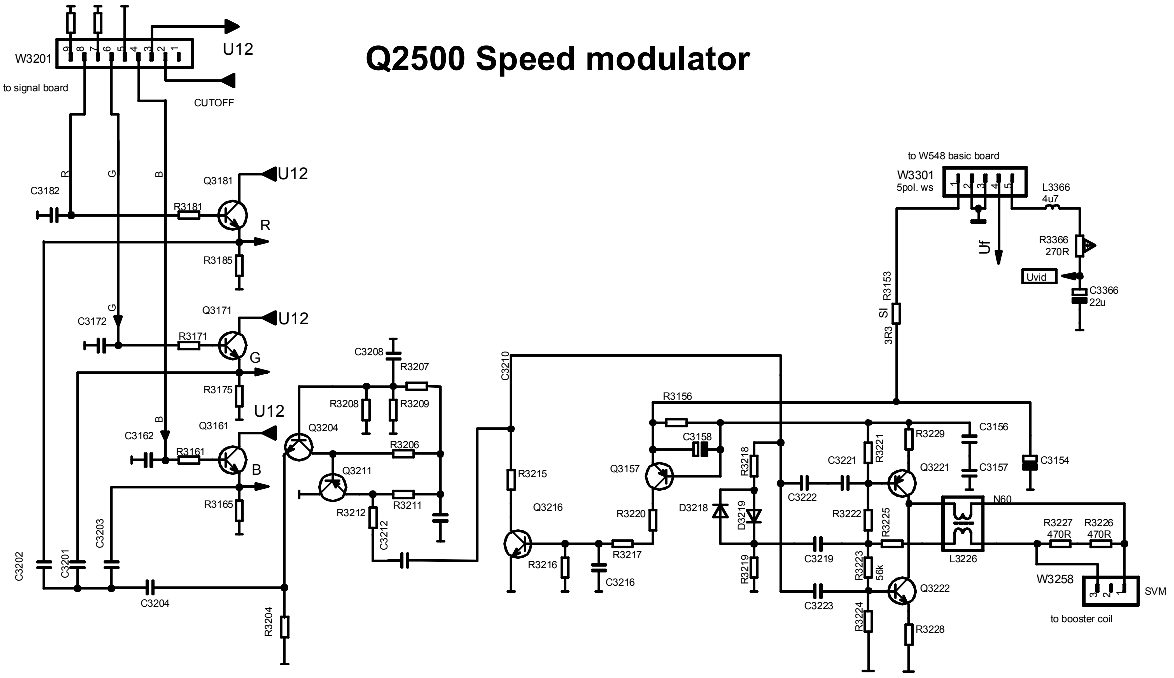

J
t
Sum of RGB signals
J
t
Horontal deflection current
J
t
Correction signal (magnified)
J
t
Sum of deflection and correction signal
Pixels on screen

To really understand the operation of the speed modulator we must look at the light characteristics of the pixels on the c.r.t. The longer a pixel is irradiated, the more intensively it shines, and the persistence of the fluorescent image is also longer.

If the signal jumps from dark to light, the deflection is initially accelerated briefly and thereafter remains mainly on one point. In this way the first “bright“ pixel is irradiated for longer and therefore shines more brightly. At the same time the last “dark“ pixel has more time to fade and is irradiated for a shorter time.

If the signal jumps from light to dark, however, this initially causes braking and then deceleration of the deflection in the speed modulator. This means the last “light“ pixel is irradiated longer and therefore shines more brightly. On the other hand, the first “dark“ pixel is irradiated for a shorter period.

In both cases another, simultaneous effect occurs. The signal change occurs while the electron beam, without almost any further deflection, remains on the last “bright“ pixel.



Q2500 Speed modulator

W3201
to signal board
U12
CUTOFF
R
G
B
C3182
Q3181
R3181
R3185
C3172
Q3171
R3171
R3175
C3162
Q3161
R3161
R3165
U12
C3202
C3201
C3203
C3204
R3204
Q3204
C3208
R3207
R3208
R3209
R3206
Q3211
R3211
R3212
C3212
C3210
R3215
Q3216
R3216
C3216
R3217
R3220
Q3157
R3156
C3158
R3218
D3218
D3219
R3219
C3222
C3221
C3219
C3223
R3221
R3222
R3223
56k
R3224
R3225
R3229
Q3221
Q3222
R3228
C3156
C3157
C3154
N60
L3226
R3227 470R
R3226 470R
W3258
SVM
to booster coil
to W548 basic board
W3301
5pol. ws
Uf
L3366 4u7
R3366 270R
Uvid
C3366 22u
R3153
3R3
SI

2.8.2 Switching of the speed modulator

The circuit is located on the c.r.t. PCB and is supplied with RGB signals from TDA 9332 via pins 40/41/42.

The RGB signals are applied to connector W 3201 pins 4, 6, 8 at 3 Vss and are then fed via impedance converters Q 3181, Q 3171 and Q 3161. To detect changes in all three colours, the signals are decoupled by capacitors C 3201, C 3202 and C 3203 together. The resulting signal is differentiated with C 3204, R 3204. Control via the RGB signals offers the advantage that this circuit also works with Teletext and OSD operation.

This means that when steep signal changes occur there are only oscillation packages with max. 0.3 Vss on the emitter of transistor Q 3204 for processing.

The input for the circuit of transistor Q 3204 has a low resistance input, so that it can process steep slopes. From the collector the 4 Vss signals are led to the impedance converter Q 3211. This supplies the signal at 6 Vss to the push-pull output stage Q 3221 and Q 3222.

The two transistors are current counter coupled and amplify the signal to a maximum 50 Vss. All voltage data refers to a black/white change and maximum contrast.

Via the voltage dividers R 3221, R 3222, R 3223 and R 3224 one end of the correction coil on pin 1 of W 3258 is set to 30 V.
The two transistors Q 3221 and Q 3222 are blocked without control, so that the other end of the coil is hanging free and no current flows through the coil. Deflection occurs only via the horizontal deflection coil.

For a positive pulse transistor Q 3221 is blocked and Q 3222 conducts. This causes a current to flow via R 3221 and R 3222 through the booster coil and via Q 3222 to earth, which accelerates the deflection.

If, however, a negative pulse is felt, then Q 3221 conducts and Q 3222 is blocked. The current now flows via Q 3221 through the coil and then on via R 3223 and R 3224 to earth. The reversed direction of current causes the deflection to be arrested.

The deflection coil is controlled directly from the collector connections. Two resistors are connected in parallel to the deflection winding to stabilise the system and using L 3226 in the control lines a throttling of clock faults is achieved.

To prevent overshooting and overloading of the output stages a protective circuit is provided on the PCB. It affects the level of the input signal.

For very steep positive or negative flanks diodes D 3318 and D 319 conduct via C 3319. Positive flanks at the output reduce the input signal via D 3218, as the signal on the output is rotated by 180°. Negative flanks on the output reduce the input signal, as the input signals are directed to earth via D 3319. The circuit specification is such that it does not operate for small signal flanks, thereby ensuring secure operation of the speed modulator over a wide spectrum.

If there is no picture signal, but only noise, the output stages have become overheated. A protective circuit is therefore provided for this case as well.

If the current in the output stages increases, there is a larger voltage drop across current resistor R 3156. The base of Q 3157 goes negative and the transistor conducts. Elko C 3158 ensures that transient, but high currents for steep flanks are possible. Using transistor Q 3157 in conjunction with transistor Q 3216 the input signals of the output phase are reduced and overloading thereby prevented.

As there is a time difference of approx. 80 ns with respect to the RGB signals in the speed modulator circuit up to modulation of the deflection speed, the RGB signal circuit must be retarded by 80 ns after decoupling from the modulator if it is to function correctly. For this reason the 80 ns time lag lines, consisting, for example, of L 3392/3393, C 3392/3398/399 and R 3391/3393 are incorporated into the RGB lines.

2.9 Colour stages

In order to avoid damaging capacitive charges caused by, for example, long cathode wires, which could lead to the frequency response being cut, the RGB output stages have been re-incorporated into the c.r.t. circuit board.

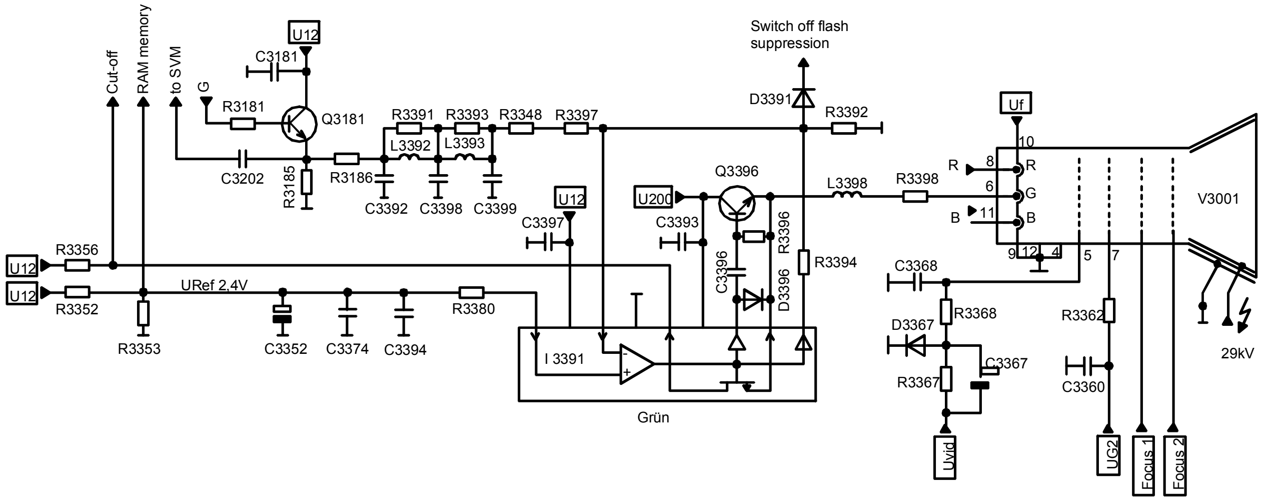
For each colour channel there is an IC whose signal bandwidth of >12 MHz guarantees a high resolution even for rapid signal changes in both directions.

The circuit for the three colour channels is identical. By using ICs the components in the output stages could be reduced to a minimum.

The output stages are energised by the speed modulator with a max. 3 Vss. Via an RC combination the respective signals reach pin 3 of the ICs and are passed on in the IC to the inverting input of an operational amplifier. The non-inverting input and thereby the work point is set via pin 1 of IC .

The resistance between pin 9 and pin 3 provides the negative feedback for determination of the amplification factor.

Colour output


Cut-off
RAM memory
to SVM
G
U12
C3181
R3181
Q3181
C3202
R3185
R3186
R3391
R3393
R3348
R3397
L3392
L3393
C3392
C3398
C3399
U12
C3397
Switch off flash suppression
D3391
R3392
U200
C3393
Q3396
C3396
R3396
D3396
R3394
L3398
R3398
Uf
R
G
B
8
6
11
10
9
12
4
5
7
V3001
R3356
R3352
U12
U12
URef 2,4V
R3353
C3352
C3374
C3394
R3380
I 3391
Grün
C3368
D3367
R3368
R3367
C3367
Uvid
R3362
C3360
UG2
Focus 1
Focus 2
29kV

For control of the c.r.t. cathodes the signals are applied at a maximum 160 Vss via pin 7 and 8. Control is via pin 8 with a corrective signal on pin 7, in order to achieve an automatic blanking current control. The emitter follower on the output of the output stage permits rapid blocking of the cathodes on transition from bright to blank. This permits the delaying effects that are otherwise present to be reduced.

The IC's also contain a component for temperature drift compensation, as well as a circuit via which the transient current can be decoupled. Current information is taken from pin 5, and so with an additional sensor control circuit an automatic blanking value control (cut off control) can be established.

2.9.1 Cut off control

The cut off control is basically a sensor control circuit. It controls electronically dynamic component tolerances and signs of wear, e.g. of the c.r.t.s.

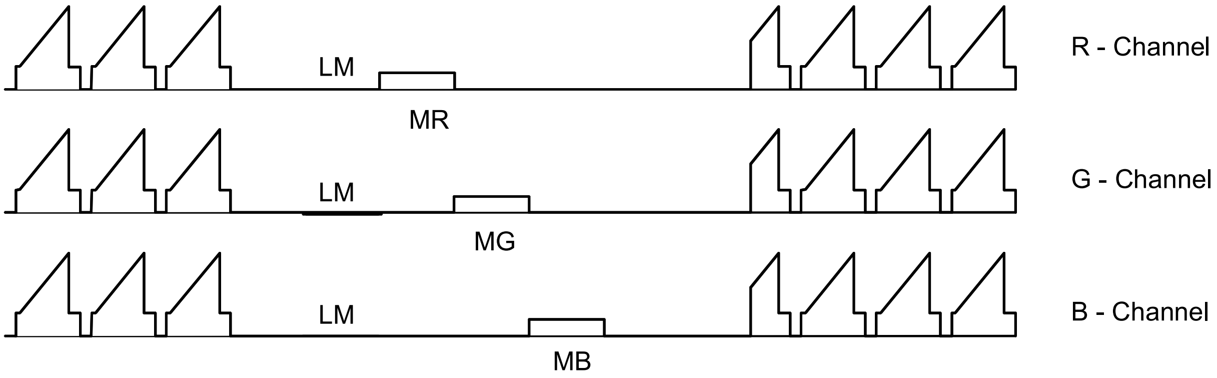
It also has the following advantages:

- automatic blanking value equalisation.
- Avoidance of colour distortion during c.r.t. warm up time and control of above average ageing in the initial operating hours.

LM = Leakage current measurement

Cut - off measurement

MR
MG
MB
} Cut - off measurement pulse


LM
MR
R - Channel
LM
MG
G - Channel
LM
MB
B - Channel

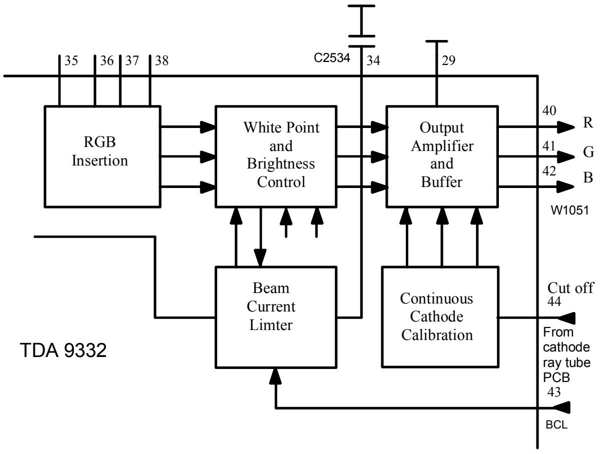
This means that the traditional adjustment controller and the associated adjustment work is no longer required.

Directly after the vertical picture return, measurements are taken of the leakage current of the c.r.t. systems at ultra blank and then, one after the other, the cathode currents of the three systems after input of a specific blank value.

These pulses are fed with the respective RGB signals via the output stages of the c.r.t. systems. From the output stage IC's the respective blank currents of the control circuit in video IC I 2521 on the signal board are supplied via its pin 44.

From a comparison between the established blank current and a reference value, which represents the specified current, a difference is obtained, which controls the cathode current via the video output stages as a controller output. It is dynamically stabilised just above c.r.t. blocking current, up to control tolerances. As small leakage currents in the output stages of the c.r.t.s could lead to distortion of the cut off control, measurement of the leakage current is carried out during the vertical flyback before measurement of the three blanking currents.

Cut - off circuit principle


35
36
37
38
C2534
34
29
RGB Insertion
White Point and Brightness Control
Output Amplifier and Buffer
40
R
41
G
42
B
W1051
Beam Current Limter
Continuous Cathode Calibration
Cut off 44
From cathode ray tube PCB
43
BCL
TDA 9332

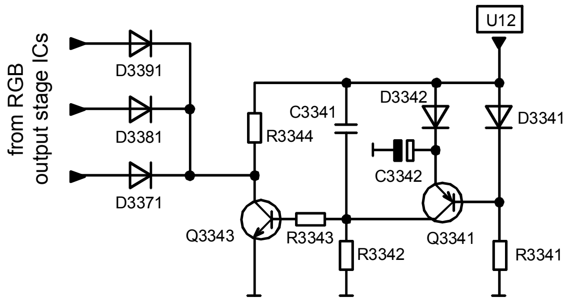
A consequence of a change to the UG2-voltage is that the cut off control opposes this change. Only a transient effect can be detected on the screen, as long as the control

range of the cut off control is not exceeded. This means an optical comparison of the raster 2 voltage is ruled out. A comparison using a voltmeter is also very unreliable, as the voltage source with approx. 500 MOhm is very resistive.
A comparison of the raster 2 voltage is therefore made in service mode.

2.9.2 Switch off flash suppression

Transistors Q 3341 and 3343 are responsible for suppressing fluorescent flashes on switch off, caused by c.r.t. charges that are not discharged quickly enough via the bleeder in the DST. On start up and during operation they have no function, as the base and emitter of Q 3341 are at the same level it is therefore blocked, as is Q 3343.

Switch off flash suppression



On shut down the base of Q 3341 via R 3341 very quickly becomes zero volts. Due to Diode D 3342, that is blocked in the direction of the power supply, Elko C 3342 cannot discharge. Q 3341 switches through and that in C 3342 can switch through via the emitter-collector the output side connected transistor Q 3343. In this way the RGB signals that control the output stage IC's are directed to earth.
Fluorescent image persistence is thus avoided.
Until Elko C 3342 is discharged and the circuit becomes ineffective, the c.r.t. discharges via the bleeder.

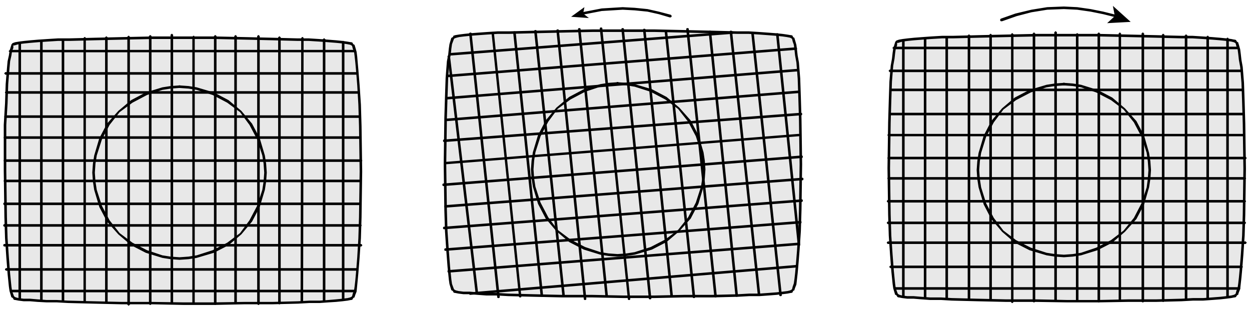
2.10 Rotation panel

2.10.1 Raster correction

So as the earth's magnetic field affects the colour uniformity of the c.r.t.s, it also influences the picture raster. For a geometrical comparison, a definite alignment towards east ("face to east") is therefore prescribed.

If the device is turned towards another point of the compass, rotation of the picture on the screen occurs according to the type and size of c.r.t. and local characteristics.

Raster correction



"Face to East" comparison

Raster rotation
"Face to North"

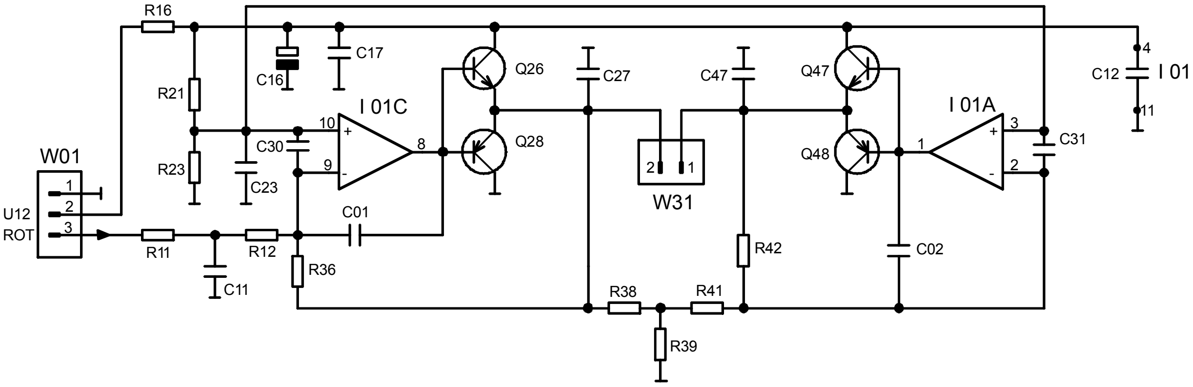
Correction of raster
rotation by rotation panel

To compensate for this a rotation panel (raster correction) is incorporated into the 81 cm device with chassis Q 2500. As the effect on the raster is less on smaller and 4:3 tubes the rotation panel is not required.

For the raster correction a circular coil is attached to the cone of the c.r.t. If a uniform current flows through it, the electron beam rotates around its own axis. As the created magnetic field overlays the field of the deflection coils, the picture can be rotated about its central point.

2.10.2 Circuit

For raster correction the DAC on pin 25 of the video/deflection processor TDA 9332 is used. The voltage produced can be adjusted by the user via “rotate picture“ and in service mode. It flows via W 1021, pin 3 to the rotation panel W 1, pin 3.



In this way the inverting input of the operational amplifier on pin 9 of I1C is controlled on the rotation panel. At maximum anticlockwise rotation approximately 3.2 V is applied and at maximum clockwise rotation 3.3 V. The operational point is adjusted on pin 10 by R21 and R23. According to the voltage difference between pin 10 and pin 9 the push-pull stage Q26 and Q28 is controlled. On the base connections there is a voltage of 0.6 to 10.6 V. The output voltage of the push-pull stage is applied to pin 2 of the correction coil and at the same time is fed to the inverting input of operational amplifier I1A via R 38 and R41. This also controls the second push-pull stage Q 48/Q 47. The two OPVs and push-pull stages counteract each other. This means that a current can flow to earth via Q 26, through the correction coil (from pin 2 to pin 1 on W31) and via Q48. On pin 8 of the OPV there is a voltage of 10.6V at maximum clockwise rotation and on the other output pin 1, 0.6 V. Otherwise the current flows via Q 47 through the correction coil (in this case from pin 1 to pin 2 on W 31) and via Q28 to earth.

In this way the current can be adapted to the required correction with respect to direction and size. This correction can, however, also act in reverse, if the coil is rotated on the deflector.

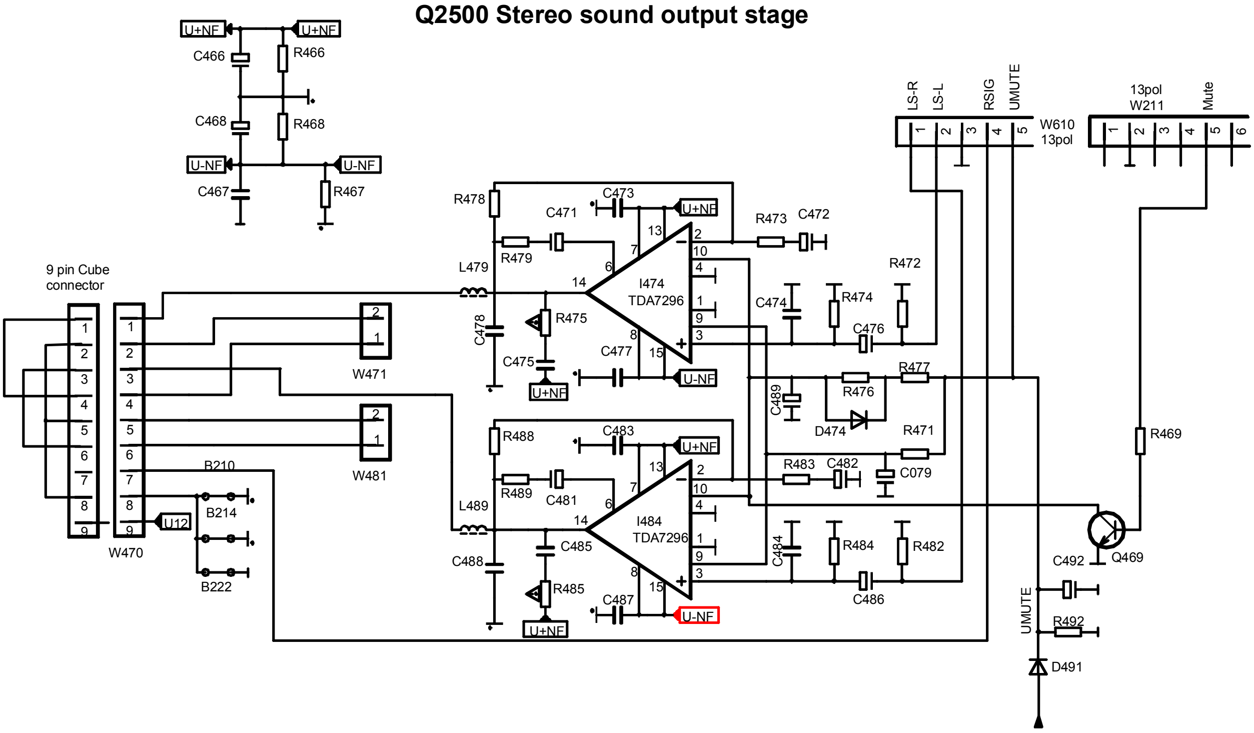
The control electronics for the rotation coil is fixed firmly to the Q 2500 chassis. However, the rotation coil and control electronics should be considered as a unit. In the event of a fault the coil is then changed as a complete unit.

2.11 NF output stages

The two amplitude controlled VF signals are output from pins 56 and 57 of MSP 3411 on the signal board. The signals are applied to the base of transistors Q2081/2083. The transistors are switched as impedance converters to prevent, as far as possible, the coupling of interference pulses on the VF wires between MSP and the output ICs.

The VF signals reach the two output stages via the coupling capacitors C 2082/476. In between are the two mute transistors Q 1586/88. (See signal board).

Q2500 Stereo sound output stage


U+NF
U+NF
C466
R466
C468
R468
U-NF
U-NF
C467
R467
9 pin Cube connector
W470
W471
W481
B210
B214
B222
U12
R478
C471
C473
R479
L479
C478
R475
C475
C477
I474
TDA7296
L489
R488
C483
R489
C481
C485
C488
R485
C487
I484
TDA7296
R473
C472
R472
C474
R474
C476
R477
C489
R476
D474
R471
R483
C482
C079
C484
R484
R482
C486
LS-R
LS-L
RSIG
UMUTE
W610
13pol
13pol
W211
Mute
R469
Q469
C492
R492
D491
UMUTE

The output stages are implemented easily as all control processors (volume, tone, balance) as well as base width switching are processed in the MSP.

Compared to previous models the Q 2500 has new output stages. TDA 7296 is equipped with an internal mute function that removes any residual on and off switching interference that is not fully suppressed by the additional mute switching.

The internal mute switching is controlled on pins 9/10. If the voltage on the pins is <3 V, then the output stages is muted. These two pins are controlled via R/C combinations via UMUTE. On start-up the two capacitors C 479/C 489 are charged slowly via the load resistors R 471/R 476 and R 477. The mute function in the IC is achieved via a voltage differential on pin 9 and pin 10. As long as pin 9 is more positive than pin 10, then the output of IC internal is muted. This is achieved on start-up/ shutdown by the R/C combination with various time constants.

On start-up C 479/22 µF is very quickly charged up by R 471/22 k. For C 489/22 µF charging occurs more slowly via R 477/10 k and R 4476/33 k. This means that in the charging phase pin 9 is more positive with respect to pin 10. On shut down C 489 discharges rapidly via D 474 (which releases R 476) and R 477. Pin 9 is again more positive with respect to pin 10 and mute is implemented again internally.

TDA 7296 can be considered to be an operational amplifier. It is controlled by its non-inverting input pin 3. The amplification is calculated from the negative feedback combination R 478/473.
This results in

$$V = 1 + \frac{R\ 478}{R\ 473} = 1 + \frac{22\ k}{0.68\ k} = 33$$

The amplified signal is felt on pin 14 and for the left channel is fed to the loudspeakers via L 479.

The R 479/C 471 combination is necessary for an internal bootstrap. In addition, the output phase is equipped with an overload and temperature protection circuit.

The two output stages are supplied with voltage symmetrically. It is taken from the transformer at zero potential and rectified and smoothed by D 686/687 and C 687. With the help of the R/C combination 466 and 468 it is split into +/- 18 V (see also power supply).

This measure achieves a halving of the peak current by the rectifier diodes D 686/687 and a higher undistorted output performance, especially for low frequencies.
An output stage without any electrolytic capacitors contributes to this.

3 Receiver components

3.1 HF/IF unit

Four receive components can be used in devices with Q 2500 chassis. One is the terrestrial tuner, or HF/IF component, which processes frequencies from 47 MHz to 860 MHz. This hyperband tuner is located on the basic board.

Second is the single SAT or dual SAT receiver for the first IF from 950 MHz to 2150 MHz. This is partly a standard feature or can be retrofitted for certain sets.

In addition, for full IP sets a PIP-HF/IF unit for the reception of terrestrial signals is incorporated into the hyperband range. In this case, however, the audio band is dispensed with, as picture for picture only video signals are required. This is also built into the basic board.

With this equipment the set is able to process all television signals, irrespective of whether they are received by terrestrial antennae or via cable units, and even when derived from parabolic antennae.

3.1.1 HF/IF components

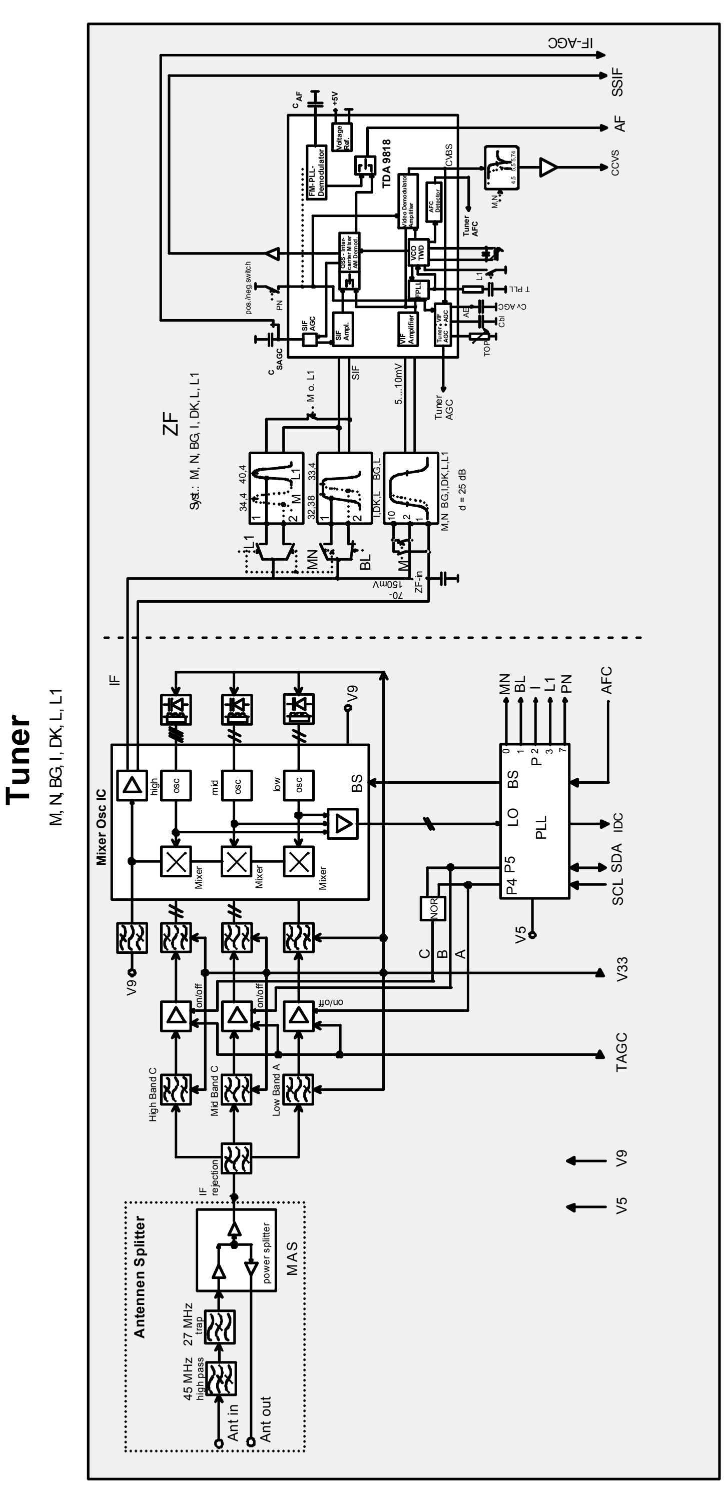
A HF/IF combination is also used. All functions for current European television standards are located in one housing, with two provisos. The IF consists of only one picture IF. The audio demodulation takes place in the audio IC on the signal board. From the IF component only the sound IF is supplied as broadband.

This means that the ceramic transducer and an expensive sound/IF switch are not required. Secondly, for lower price models not destined for export HF-IF, designed only for PAL and SECAM BG, is used. In this case, the change-over to SECAM L and NTSC and the components necessary for this are not required.

This means the two designs are hardware and software compatible.

The following block circuit diagram shows the multi-standard design. Some of the components are not fitted to the BG version.

As in earlier models, the electronics is housed in an HF proof folding housing.

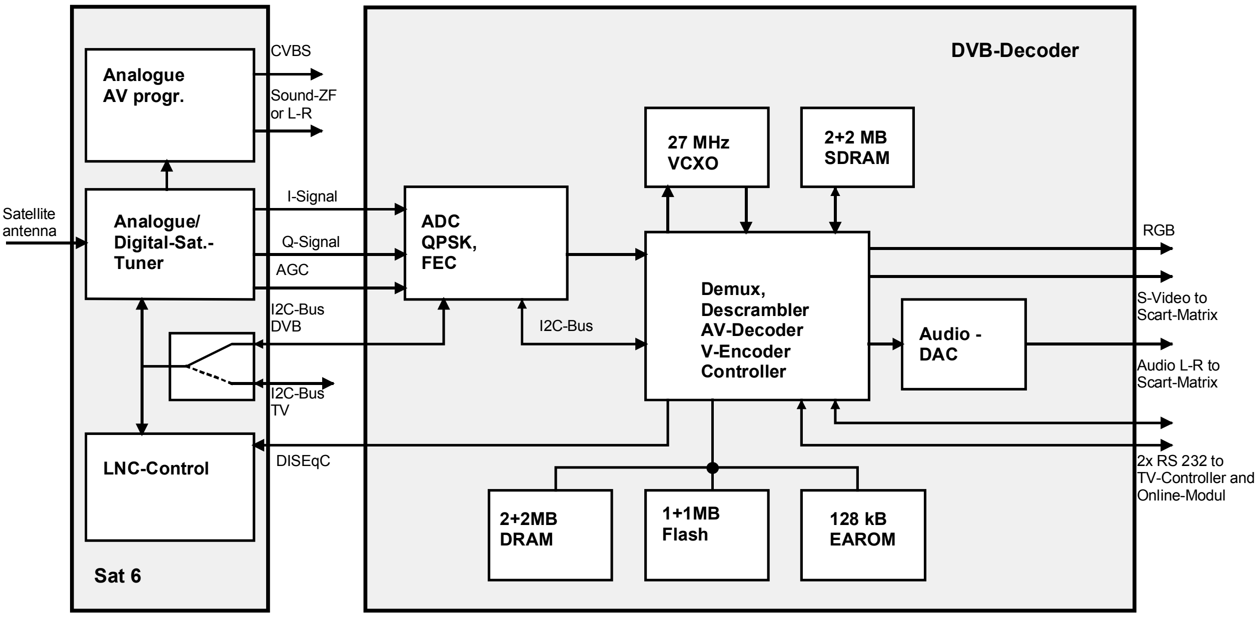

Tuner
M, N, BG, I, DK, L, L1
Antennen Splitter
45 MHz high pass
27 MHz trap
Ant in
Ant out
power splitter
MAS
IF rejection
High Band C
Mid Band C
Low Band A
on/off
V9
Mixer Osc IC
high
mid
low
osc
Mixer
BS
IF
C
B
A
NOR
V5
P4 P5
LO
BS
PLL
P
MN
BL
I
L1
PN
SCL
SDA
IDC
AFC
V5
V9
TAGC
V33
ZF
Syst.: M, N, BG, I, DK, L, L1
34,4 40,4
M
L1
MN
BL
32,38 33,4
I,DK,L BG,L
M
10
M,N BG,I,DK,L,L1
d = 25 dB
70-150mV
ZF-in
M o. L1
SIF
5....10mV
Tuner AGC
C SAGC
pos./neg.switch
PN
SIF AGC
SIF Ampl.
QSS - Inter carrier Mixer AM Demod.
FM-PLL-Demodulator
C AF
+5V
Voltage Ref.
TDA 9818
VIF Amplifier
Tuner + VIF AGC
PLL
VCO TWD
Video Demodulator Amplifier
AFC Detector
CVBS
Tuner AFC
TOP
Cbl
AE
Cv AGC
T PLL
L1
M,N
4,5 5,5 5,74
CCVS
AF
SSIF
IF-AGC

3.2 DVB Board

3.2.1 Overview

The DVB decoder is able to convert DVB signals that are transmitted free to air via satellite into the appropriate analogue audio and video signals, which are then fed to the signal processing of the TV chassis.

For the conversion of the L band signal derived from LNC or a multiswitch, the combituner of the satellite unit Sat 6 is designed as an assembly set or retrofit set for the Q 2500 chassis. It also supports the interface to an integrated online module.


Analogue AV progr.
CVBS
Sound-ZF or L-R
Satellite antenna
Analogue/ Digital-Sat.- Tuner
I-Signal
Q-Signal
AGC
I2C-Bus DVB
I2C-Bus TV
LNC-Control
DISEqC
Sat 6
DVB-Decoder
ADC QPSK, FEC
I2C-Bus
27 MHz VCXO
2+2 MB SDRAM
Demux, Descrambler AV-Decoder V-Encoder Controller
Audio - DAC
RGB
S-Video to Scart-Matrix
Audio L-R to Scart-Matrix
2x RS 232 to TV-Controller and Online-Modul
2+2MB DRAM
1+1MB Flash
128 kB EAROM

The following block diagram shows the principal architecture of the Sat 6 and DVB decoder. The interface between Sat 6 and the DVB decoder is formed from quasi-analogue I and Q signals, the AGC signal, the IIC bus and a port used for DISEqC. The IQ signals are derived in the satellite tuner by quadrature mixing of the second IF (479.5 MHz) in the base band. The AGC signal provides amplitude control of the IQ outputs of the tuner. As the Sat 6 unit is able to process analogue and digital signals, both the DVB controller and the TV controller have access to the tuner and the LNC supply. The switching of the IIC buses used for this is achieved by the TV controller driven by the Sat 6 unit.

The processing of DVB signals from the tuner base band interface to the analogue output is achieved by two high integration chips. The first is the front-end component STV0299B (ST microelectronics) that digitises the IQ signals coming from the tuner by means of dual ADCs, demodulates them (carrier and pulse extraction) and carries out Forward Error Correction. The second component is the MPEG-2 demultiplexer-, decoder-, backend- and controller chip STi5500 (ST Microelectronics), which demultiplexes the MPEG-2 transport beam, feeds the selected audio and video components to the MPEG-2 decoder for decompression, decodes them and then converts them into analogue output signals. The STi5500 also has an integrated 32-bit RISC controller that forms the core of an independent processor subsystem. It is responsible for the control and diagnosis of the other functional units of the DVB decoder module. Commands and data are exchanged via a serial interface to the TV controller. In addition, the DVB is responsible for applications such as the Electronic Program Guide for DVB programmes. In this case the on screen display from the OSD component of the MPEG-2 video decoder is produced. For communication between the TV controller and the controller of the online modules, the data is transferred transparently between the two serial interfaces.

3.3 Features and parameters

3.3.1 DVB internal features

Feature	*Standard/value range*	*Notes*
General		
Receiving and decoding of DVB compatible free to air signals via satellite		
Implementation as integrated module for incorporation or retrofitting in Q 2500	Q2500 basic, medium, high end	
Operational control integrated into the Personal Control System		
Electronic Programme Guide based on standard DVB-SI		
Pre-programming	ASTRA 19.2° East and Eutelsat 13° East	
MPEG-2 main Profile@Main level	720x576 Pixel, 25 Hz	
Support for 4:3 and 16:9 source format (letterbox filtering) and 4:3 display format (16:9 display format by scaling in TV up converter)		Pan&Scan is not used
Teletext processing to DVB teletext standard	ETS 300 472, s. [5]	Reinsertion in the Y signal
Support for DVB radio programmes		

Feature	***Standard/ value range***	***Notes***
Satellite front end		
Demodulation and channel decoding to DVB satellite standard		
Use of the combituners (analogue/digital) of the Sat-6 satellite unit		
Input level area	45...80 dBµV	to 75 Ohm
Input frequency level	950...2150 MHz	
Input socket	F female, 75 Ohm	
IF wideband	36 MHz	-3 dB
Demodulation	QPSK	
Demodulation	QPSK	
Symbol rate	15...30 Mbaud	1...30 Mbaud adjustable 15...30 Mbaud guaranteed
Forward Error Correction	Viterbi, De-interleaving and Reed Solomon	
Use of the LNC voltage generation of the Sat 6 satellite unit or an optional switch fitted directly on the DVB module		
Option for antenna control	13/18 V, 0/22 kHz, DiSEqC Tone Burst, DiSEqC 1.1(partial)	
LNC current	400 mA	

Feature	*Standard/ value range*	*Notes*
Audio/video backend		
Interfaces to chassis	FBAS/audio input (SAT6), RGB output, S video/FBAS output, audio output (Stereo)	
Controller and graphics		
Controller	32 bit RISC controller, 50 MHz clock	
Working memory	4 Mbyte DRAM, 2 Mbyte Flash ROM	
MPEG and video memory	4 Mbyte SDRAM	
Graphics	Internal OSD with 720x576 pixel resolution; to 8 bit/pixel, 4 bit/pixel used	
OSD comparison in service mode (background brightness)	Y_nominal+/-6 levels	

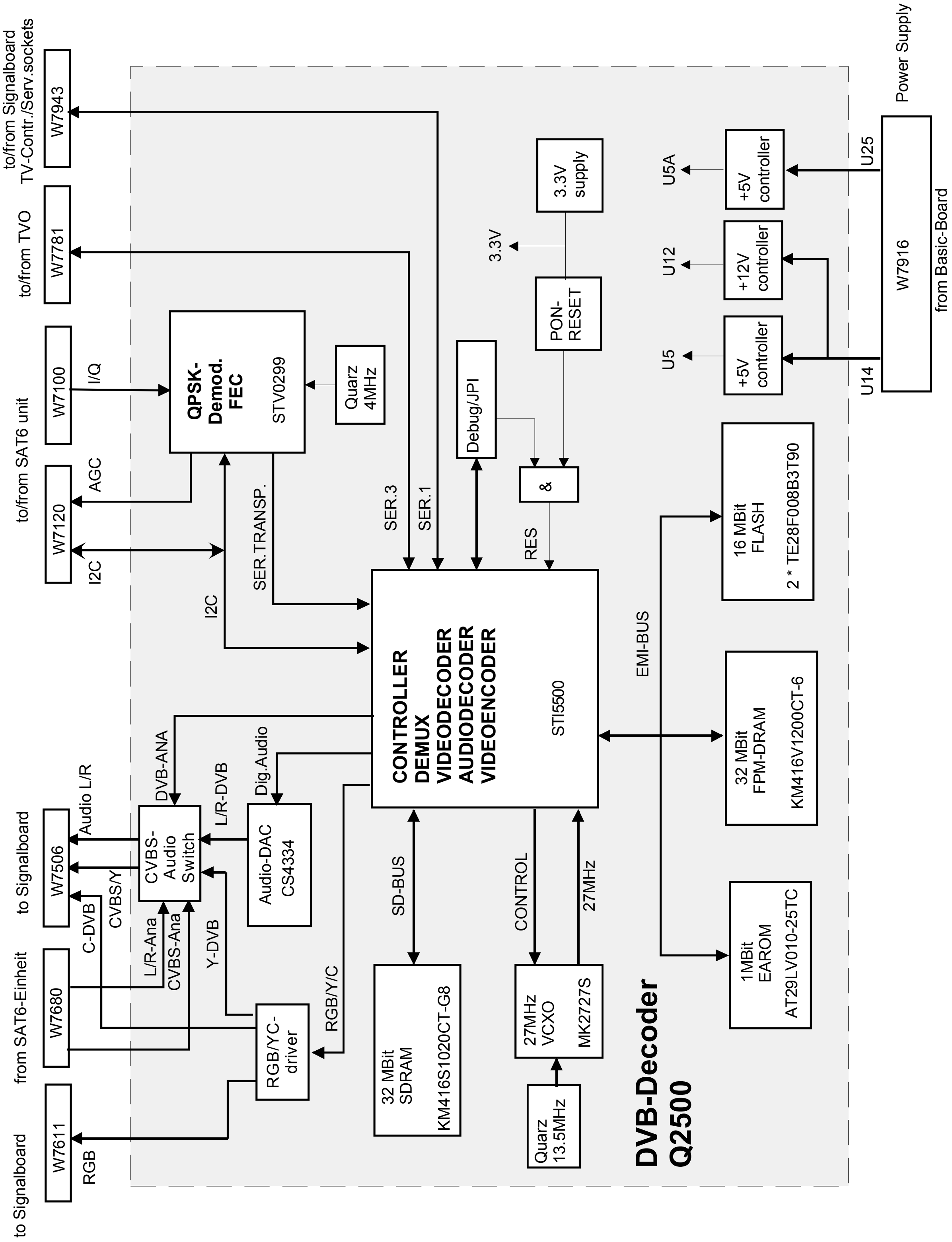
Feature	*Standard/value range*	*Notes*
Software		
Local update of operating software	DVB module: via service socket (RS232-Interface, 5 V)	
Generation and update of programme list via various options: pre-programming, frequency search procedure, semi-automatic programme search (manual setting of carrier currents and automatic search for carrier current levels)		
Separate search procedure for DVB television and radio programmes		
Automatic setup of audio channels (default: configuration in menu language) and display of options (menu tree: sound/voice)		
Programme information: Decoding and display of Present_Event and Following_Event via DVB-SI and Teletext		
Generation of an SI database for freely selectable preferred programmes		
With Next-View harmonised Loewe Digital EPG		
Separate Radio EPG		
Detection of encrypted programmes		
Detection of inconsistent data, robust reaction and generation of messages on fault detection		
DVB Service Mode for comparison (VCXO), diagnostics (Test picture) and deletion of DVB-EAROMs		

3.3.2 DVB/TV features

Feature	*Standard/Value range*	*Notes*
PIP: DVB in TV or VGA, TV in DVB		Satellite: 2 independent leads and Sat 6 twin fitting necessary!
Automatic picture format switching		
Creation of a common programme list with analogue and digital programmes with special recognition of the digital programmes	„D“	
Separate radio mode with radio programme list		

3.3.3 Architecture

The following block diagram shows the architecture of the DVB decoder for Q 2500.


DVB-Decoder
Q2500
to/from Signalboard TV-Contr./Serv.sockets
W7943
to/from TVO
W7781
to/from SAT6 unit
W7100
I/Q
W7120
AGC
I2C
from SAT6-Einheit
W7680
to Signalboard
W7506
Audio L/R
to Signalboard
W7611
RGB
QPSK-Demod.
FEC
STV0299
Quarz 4MHz
SER.TRANSP.
SER.3
SER.1
I2C
Debug/JPI
3.3V supply
3.3V
PON-RESET
&
RES
CONTROLLER
DEMUX
VIDEODECODER
AUDIODECODER
VIDEOENCODER
STI5500
DVB-ANA
Dig.Audio
L/R-DVB
CVBS-Audio Switch
Audio-DAC
CS4334
CVBS/Y
C-DVB
L/R-Ana
CVBS-Ana
Y-DVB
RGB/YC-driver
RGB/Y/C
SD-BUS
32 MBit SDRAM
KM416S1020CT-G8
CONTROL
27MHz
27MHz VCXO
MK2727S
Quarz 13.5MHz
EMI-BUS
16 MBit FLASH
2 * TE28F008B3T90
32 MBit FPM-DRAM
KM416V1200CT-6
1MBit EAROM
AT29LV010-25TC
U5A
+5V controller
U12
+12V controller
U5
+5V controller
U25
U14
W7916
Power Supply
from Basic-Board

3.4 Components

3.4.1 Satellite front end

3.4.2 Functional distribution

The satellite front-end processes the signal of the 1. satellite IF coming from the Universal-LNC or Multiswitch up to the MPEG-2 carrier current, fed to the MPEG-2 demultiplexer/decoder. It also houses the components for the supply and control of the antenna units. The functions mentioned are distributed to blocks of the Sat 6 (Tuner, LNC supply) unit DVB decoder (AD conversion, demodulation, forward error correction). The separation is implemented via an analogue/digital satellite tuner in order to be able to use redundancy free processing of TV and DVB signals. The reasons for the choice of interfaces are:

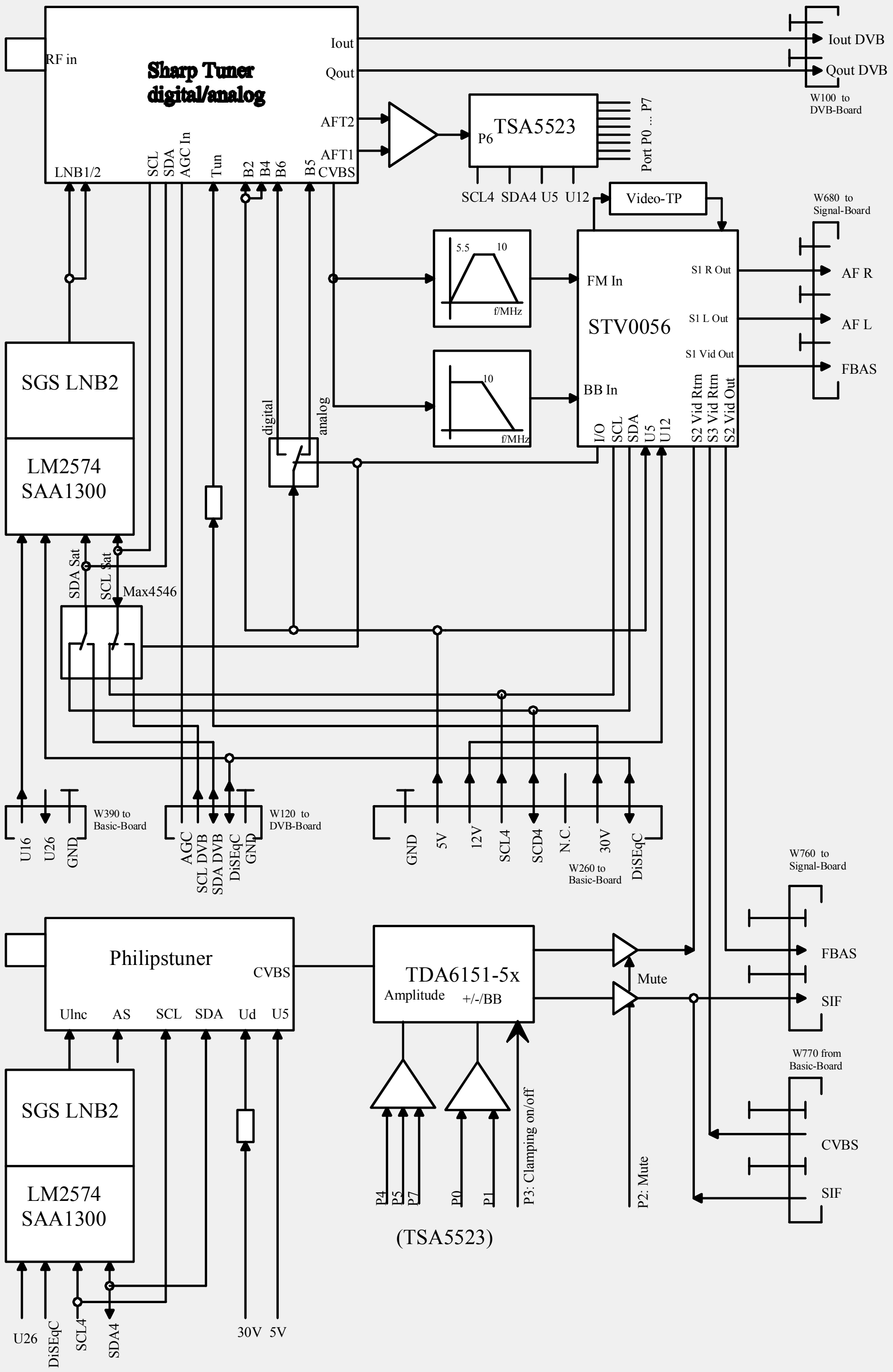
Fewer requirements for the screening of the Sat 6 unit and low-interference quasi-analogue baseband interface to DVB decoder.

Due to the functional unity, the relevant parameters for DVB reception of the Sat 6 unit are specified in the following.

3.4.3 Tuner

The tuner converts the signal of the 1. satellite IF in the base band. Signal processing for analogue and DVB signals is distinguished only in respect of demodulation, and is therefore almost identical with respect to the pre-filtering and amplification stages, mixing on the 2. IF, channel selection and amplification. For this the implementation of an analogue/digital combi-tuner is advised.
The Sat 6 unit incorporates the BS2W7VG2002 (Sharp) analogue/digital satellite tuner

Sat6: Main - analog/digital Twin: analog


Sharp Tuner digital/analog
RF in
Iout
Qout
AFT2
AFT1
CVBS
LNB1/2
SCL
SDA
AGC In
Tun
B2
B4
B6
B5
Iout DVB
Qout DVB
W100 to DVB-Board
TSA5523
P6
Port P0 ... P7
SCL4 SDA4 U5 U12
Video-TP
W680 to Signal-Board
5.5
10
f/MHz
FM In
BB In
STV0056
S1 R Out
S1 L Out
S1 Vid Out
AF R
AF L
FBAS
I/O
SCL
SDA
U5
U12
S2 Vid Rtrn
S3 Vid Rtrn
S2 Vid Out
digital
analog
SGS LNB2
LM2574
SAA1300
SDA Sat
SCL Sat
Max4546
U16
U26
GND
W390 to Basic-Board
AGC
SCL DVB
SDA DVB
DiSEqC
GND
W120 to DVB-Board
GND
5V
12V
SCL4
SCD4
N.C.
30V
DiSEqC
W260 to Basic-Board
W760 to Signal-Board
Philipstuner
CVBS
Ulnc
AS
SCL
SDA
Ud
U5
TDA6151-5x
Amplitude
+/-/BB
Mute
FBAS
SIF
W770 from Basic-Board
CVBS
SIF
P4
P5
P7
P0
P1
P3: Clamping on/off
P2: Mute
(TSA5523)
SGS LNB2
LM2574
SAA1300
U26
DiSEqC
SCL4
SDA4
30V
5V

3.4.4 DVB demodulation and fault correction

Additional signal processing comprises:

- AD conversion of the quadrature signals from the tuner,
- QPSK demodulation and channel decoding in the form of Forward Error Correction.

Demodulation and channel decoding are compatible with ETS 300 421. In practice an in-house chip solution is used for all three functions. For reasons of interface compatibility with the MPEG decoder, the STV0299B module from ST Microelectronics is used. There then follows specification of the practical implementation, as well as parameters, which in ETS 300421 are only partially set.

Parameter	Value/algorithm	Notes
Chip	STV0299B	Manufacturer: ST Microelectronics
ADC		
ADC-Type	Dual	
Resolution	2*6 bit	
Sampling Clock	Variable, dependent on symbol rate	Generated by on chip PLL
IQ input voltage	1 Vss	
Demodulation		
Procedure	Coherent grey coded QPSK demodulation	
Symbol rate range STV0299B	1...45 Mbaud	
Symbol rate over all (including tuner) without neighbouring channel assignment	1...30 Mbaud	Lower limit: Phase noise of tuner Upper limit: IF bandwidth of tuner
Symbol rate over all with neighbouring channel assignment	15...30 Mbaud	
Preferred value for symbol rate	27.5 and 22 Mbaud	Used in frequency search procedure
Other symbol rates	Decoding from NIT (delivery system descriptor) of Barker Channel or manual selection	
Roll off filtering	Half Nyquist	
Roll off factor	0.20 (20 %); 0.35 (0.35 %)	
Used roll off factor	0.35 (35 %)	
Carrier recovery	Digital PLL with internal derotator and hardware lock-in detector	
Pulse recovery	Internal digital PLL	
Processing of the normal or inverting spectrum		

Parameter	Value/algorithm	Notes
Chip	STV0299B	Manufacturer: ST Microelectronics
AGC	AGC analogue/digital tuner with PWM output. Internal digital AGC on power optimisation within the signal bandwidth.	
AFC	digital software AFC	
Forward Error Correction (FEC)		
1. FEC stage	Viterbi decoder	
- Constraint length	7	
- Rate	½	
- Other code rates	½, 2/3, ¾, 5/6, 7/8	
- Rate selection	Automatic or manual	
2. De-interleaver		
- Synchronous word extraction		
- Convolutional interleaver		
- Depth	12	
3. Reed Solomon Decoder		
- Number of parity bytes	12	
- Block length	204	
- Correctable byte error	8	
- Energy dispersal de-scrambler		
Other		
- Carrier current output	Parallel or serial	
- Used mode for output	Serial	
- Control	IIC bus	
- On Chip Error Monitoring		

3.4.5 LNC supply

The components for LNC supply located on the Sat 6 unit or optionally on the DVB module. The control of the circuit on Sat 6 is by DVB operation via the IIC bus and a free port (DISEqCWR) of the DVB decoder/ controller chip STi5500. In TV operation the TV controller assumes control of the Sat 6 unit. This achieves better decoupling of the software module.

Parameter	Value	Note
LNC voltages	0/14/18 V	
LNC current	max. 400 mA	
Current limitation	Electronic	
22 kHz signal	yes (modular)	
Amplitude pf 22 kHz signal	1 Vss	
Duty cycle	(50 +/- 10) %	
DISEqC version	1.0 and partially 1.1	Write only

4 Signal board

Mounted on the signal board, which is linked to the basic board via connectors, are all the necessary building blocks for device control, interface switching, video, audio and videotext processing.

These are:

- The device control with computer circuit, operating software and the EAROM for the storing of system data and customer specific calibration values.
- Production of system cycle frequency necessary for a digital design.
- The digital IC's necessary for picture signal processing.
- The video/deflection processor for the production and synchronization of control pulses.
- Digital audio processing for analogue transferred information and NICAM decoding.
- The teletext decoder, integrated into the SDA 6000, with page memory, in which up to 3000 text pages, according to design, can be saved and which also generates the OSD for the user control.
- The signal and interface selection by corresponding IC's controllable via the I²C bus.
- Optional IC's for video processing, picture in picture.

4.1 Device control

Full device control is implemented by a Siemens 16 bit processor (SDA 6000) together with Loewe operating software. The teletext function is also integrated into the SDA 6000. A standalone teletext processor is therefore not necessary.

All processes in the digital signal preparation, in the tuners and interface selection are checked and controlled via a microcomputer integrated into the SDA 6000. The processor is also known as the CCU (Central Control Unit).

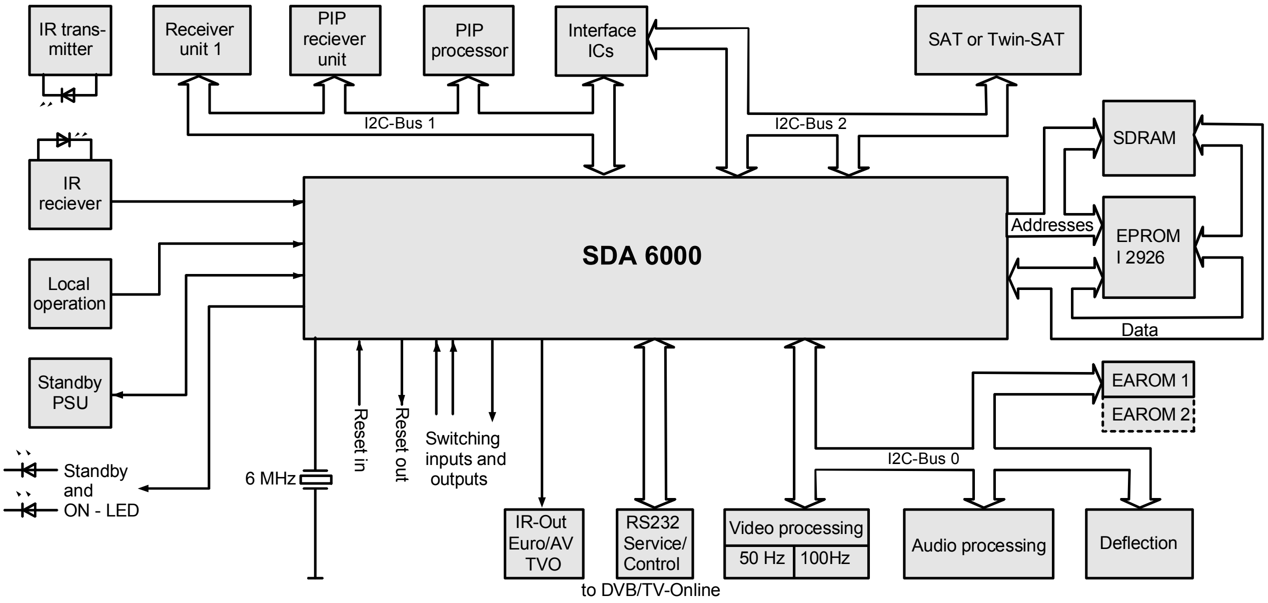
It also supports the operating, tuning and storage system on the frequency synthesis principle. Without the DVB module there are 220 programme storage locations, and with the DVB board there are 1470. The programme locations are available for TV and also for radio operation. The total number of stored programs must not exceed 220 (1470). For the AV inputs six additional places are reserved.
Operating software is held in an external EPROM. For the storage of c.r.t. and system specific data there is an EAROM for device control. The latter also contains programme location information.

All three modules, CCU, EPROM and EAROM are mounted on the signal board.

The remote maintenance sensor permits control of possible device functions. The chassis tuning is also carried out by remote maintenance.

For this, the sensor IC generates a serial data word for each command that is transferred to the receiver with a delay. This signal is demodulated by the IR receiver and prepared in such a way that it can be sent directly to the CCU as an RSIG signal.
The CCU detects the local operating commands on a line by the different voltage levels.

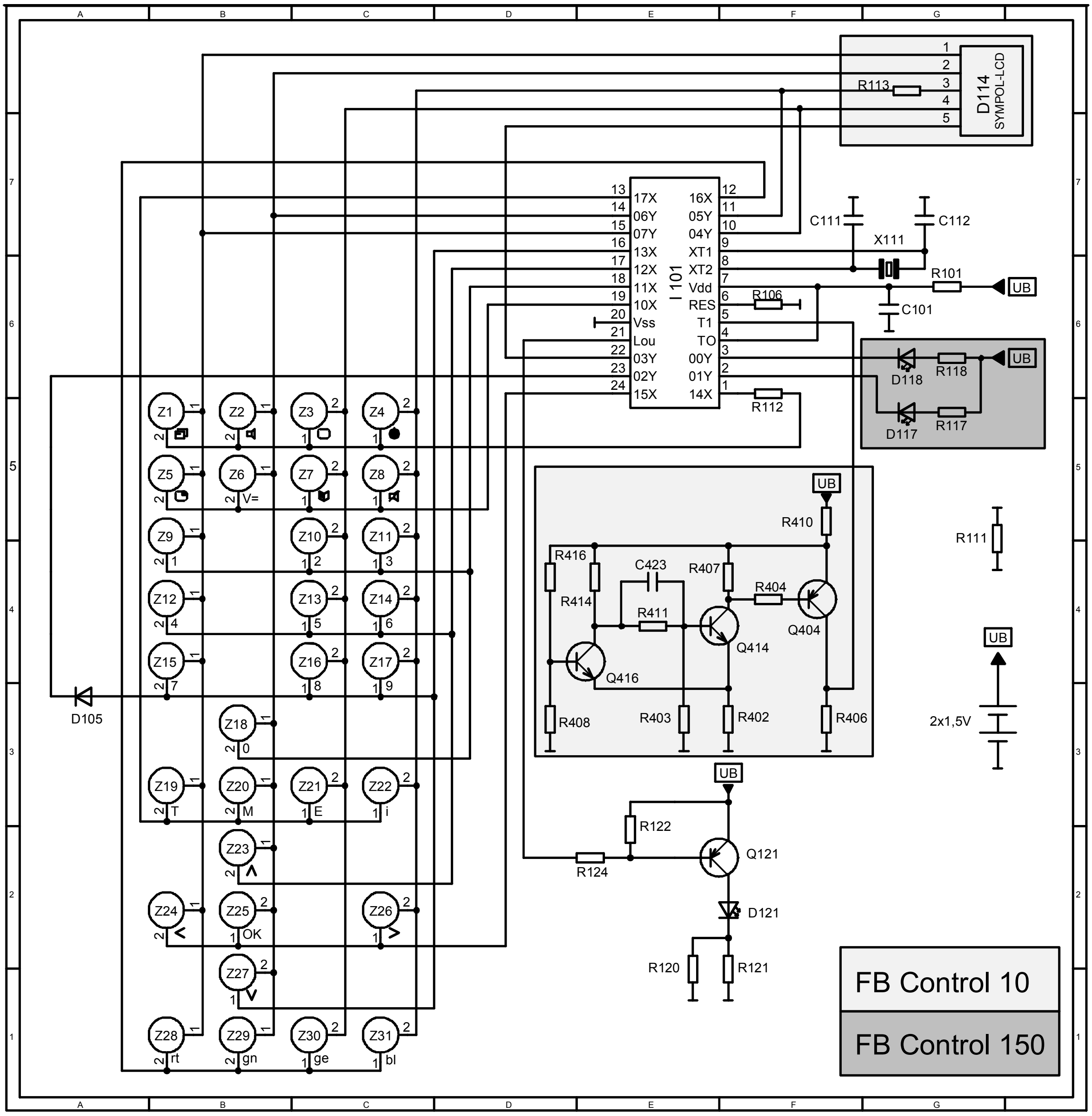
Block diagram - Device control


IR trans-mitter
Receiver unit 1
PIP reciever unit
PIP processor
Interface ICs
SAT or Twin-SAT
I2C-Bus 1
I2C-Bus 2
SDRAM
IR reciever
SDA 6000
Addresses
EPROM I 2926
Local operation
Data
Standby PSU
EAROM 1
EAROM 2
Reset in
Reset out
Switching inputs and outputs
I2C-Bus 0
Standby and ON - LED
6 MHz
IR-Out Euro/AV TVO
RS232 Service/ Control
Video processing
50 Hz
100Hz
Audio processing
Deflection
to DVB/TV-Online

The CCU operates as a central control and information module. The software is held in as external EPROM. It concerns data necessary for the control of the digital IC's, tuning, OSD's etc.

For control of all processes in the device the C 161 bus system:

- generates I²C bus 0
  transmits data to and from the EAROM. In addition it controls the picture and audio signal processing.
- generates I²C bus1
  controls the 1st and 2nd receiver unit on the basic board, the switching IC's for the audio and video signals on the signal board and the optional PIP processor.
- generates I²C bus 2
  controls the satellite units and partially controls the switching IC´s for audio and video.


D114 SYMPOL-LCD
R113
I 101
C111
C112
X111
R101
C101
R106
UB
D118
R118
D117
R117
R112
R410
R416
C423
R407
R404
R414
R411
Q404
Q414
Q416
R408
R403
R402
R406
R111
2x1,5V
D105
R122
Q121
R124
D121
R120
R121
FB Control 10
FB Control 150

4.1.1 The infrared sensor

With the state-of-the-art IR transmitter all device functions, with a few exceptions, can be controlled remotely. Starting with on/off via control functions such as volume/contrast, to control of the satellite antenna.

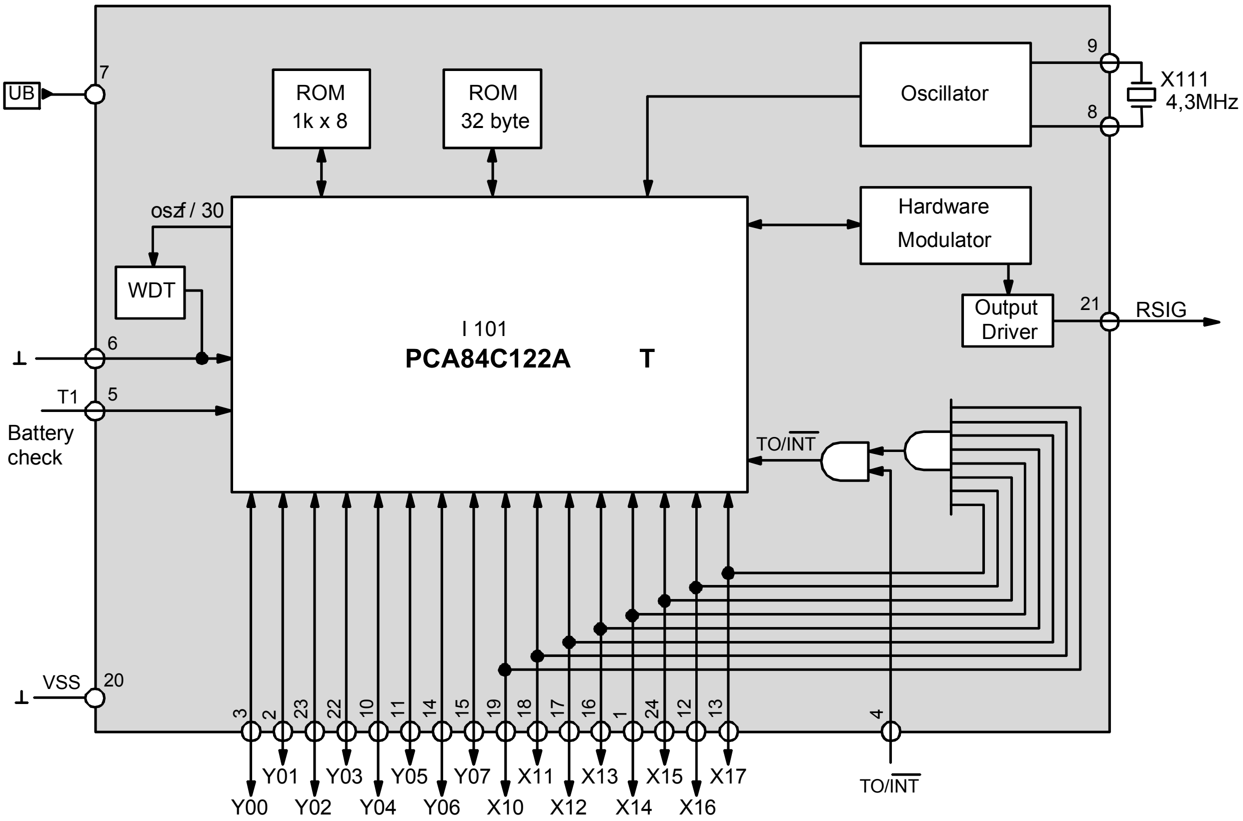
To ensure remote control of all functions, buttons must have double or extended switching functionality.

Operation is via a well-organised menu structure. For this a cursor cross is provided on the remote control. In addition, frequently used functions can be assigned to the four colour keys. This does not set the command in the remote control, but a corresponding value in the device software. In the high-quality system range device the various functions are supported by an LCD display.

An 84 C 122 Philips microprocessor is used in the remote control for the Q 2500 chassis (Control 10 for Loewe Systems and Control 150 for Loewe.). This is an 8 bit standalone microcontroller, especially designed for use in infrared remote controls. It has very little external wiring and is able to control the transmitter diode directly via an amplifying transistor. The modulator is incorporated into the IC. The processor is equipped with Loewe specific software, which is mask programmed. To operate the Q 2500 chassis, commands are issued as RC 5 code, level 0.

The operating commands are formed on the transmitter keyboard by linking a Y input (Y4 Y7) with an X input (X10 X17).

Internal circuit 84C122


UB
7
ROM
1k x 8
ROM
32 byte
Oscillator
9
8
X111
4,3MHz
oszf / 30
WDT
Hardware
Modulator
Output
Driver
21
RSIG
6
T1
5
Battery
check
I 101
PCA84C122A
T
TO/INT
VSS
20
3
2
23
22
10
11
14
15
19
18
17
16
1
24
12
13
4
Y00
Y01
Y02
Y03
Y04
Y05
Y06
Y07
X10
X11
X12
X13
X14
X15
X16
X17
TO/INT

The operating commands for videotext are specified as a sub-program in "Level 0".

The transmitter IC produces a code word for each command and adds two start bits and a control bit. The two start bits are always H, and the control bit changes each time the button is pressed. It indicates to the central control unit, whether a new command is present, or the current command is still valid.

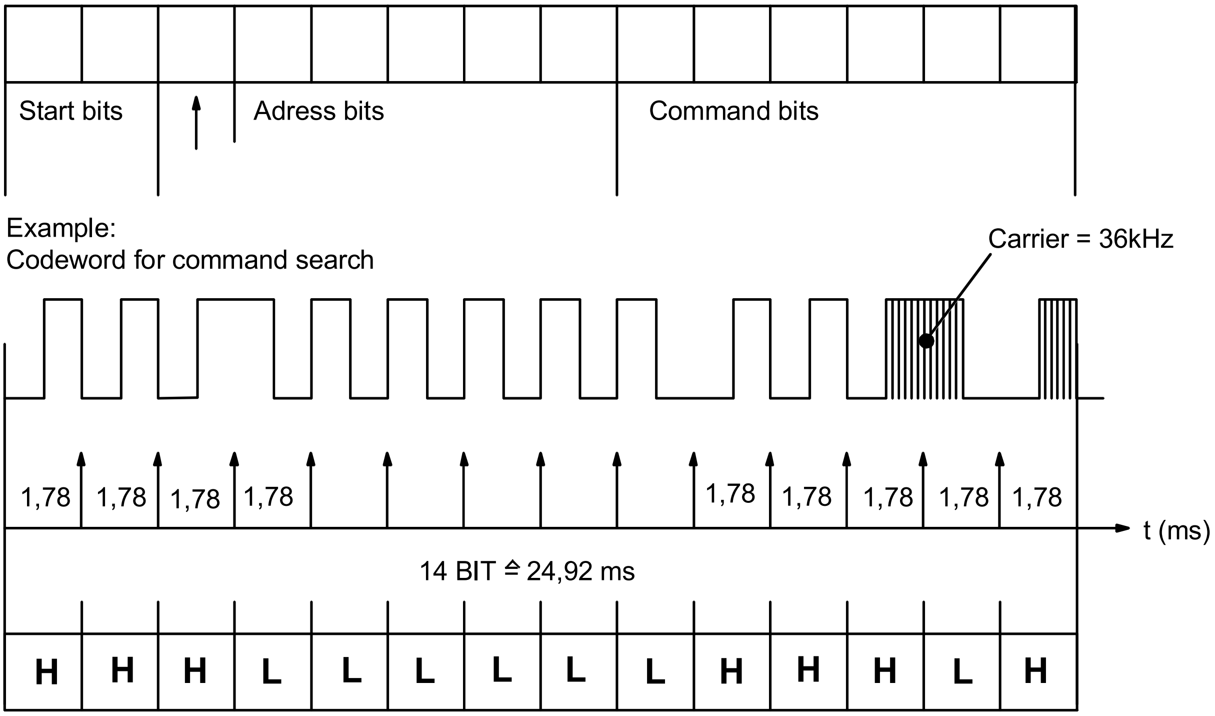
This 14 bit codeword is modulated with a 36 kHz carrier and applied serially to pin 21 of 84 C 122.

The digital Information is expressed by the step direction within the bit (Biphase).

If the button is pressed for a long time on the report control the codeword is repeated after 114 ms.

This signal is supplied to T 121 via resistor R 124, amplified and radiated via infrared diode D 121. The transmitter diode is now no longer covered by a dispersion window. This means the current can be reduced to f 900 mAss. The current can be taken directly from the battery, which means that no additional Elkos are necessary on the operating voltage.

14 BIT - Codeword



On pins 8 and 9 of 84 C 122, the ceramic oscillator X 111 is the component that determines the frequency of the pulse oscillator for the synchronisation of the system and for the production of the carrier frequency (fTr = 1/12 fCycle). Using the ceramic oscillator X 111 means that tuning of the cycle frequency is not needed.

The circuit is functional at an operating voltage of 2.5 – 3.5 V and draws a normally energised circuit current of = 1 uA and an operating current of 35 mA. The transmitter thereby achieves a range of >10 m.
The voltage source is two micro-alkali-manganese batteries.

After switching to the service mode, chassis tuning is implemented with the FB transmitter. The service mode is called up by pressing the functional button “?“ four times, so that the “Service“ display appears, and then pressing the “M“ button on the remote control within one second. Then using the curser buttons, the individual tuning functions can be called up. Tuning is also carried out using the cursor keys. The data is initially stored in the working memory C 161 and is only transferred to the memory on operation of the "ok" memory button. Once returned to normal FS operation, use the "E" button to return to remote operation.

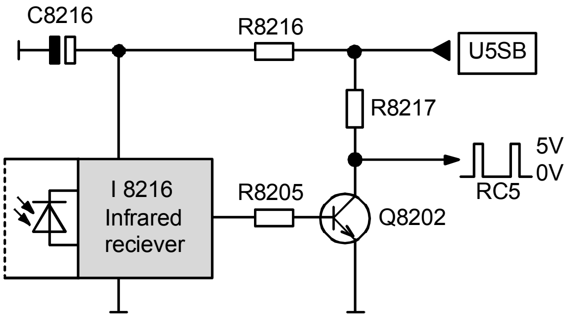
Pressing the Z 1 button switches the remote control processor to another mode. This means that the transmitter can be used for both a videorecorder and DVD player from Loewe. For the videorecorder, however, control is only possible with Korythso code, as used by Panasonic. For the DVD player we use the RC 6 code.

If the remote control is not used in the videorecorder or DVD mode for 20 sec, then it automatically switches back to the TV mode. The video or DVD mode is displayed for Control 10 by the LCD and for Control 150 by an LED on pin 2 (Y1) and pin 3 (Y0).

For Control 10 the LCD is controlled from ports Y3 to Y7. Up to Y3 these are also used to query the button matrix.

The operating voltage is also monitored in Control 10 and displayed correspondingly in the LCD. Measurement of the battery voltage is carried out by transistors Q 416, Q 414 and Q 404 on pin 5 of 84 C 122.

4.1.2 Infrared receiver



The IR receiver on the local control unit is a thick film circuit and is fully encapsulated.

The IR signal from the transmitter is converted into an electrical signal by the receiving diode, amplified and prepared in such a way that it is available on the output as 2 Vss.

With the next transistor Q 8202 on the local control unit the signal is amplified to 5 Vss. In this way the IR decoder in SDA 6000 can be safely controlled via pin 5

Via IC I 2716 and transistors Q 2721, Q 2731 and Q 2741 the IR signal is applied to pin 8 on each of the three Euro sockets. This allows hidden videorecorders to be remotely controlled via the IR receiver of the television set and the AV switching voltage line (see AV operation).

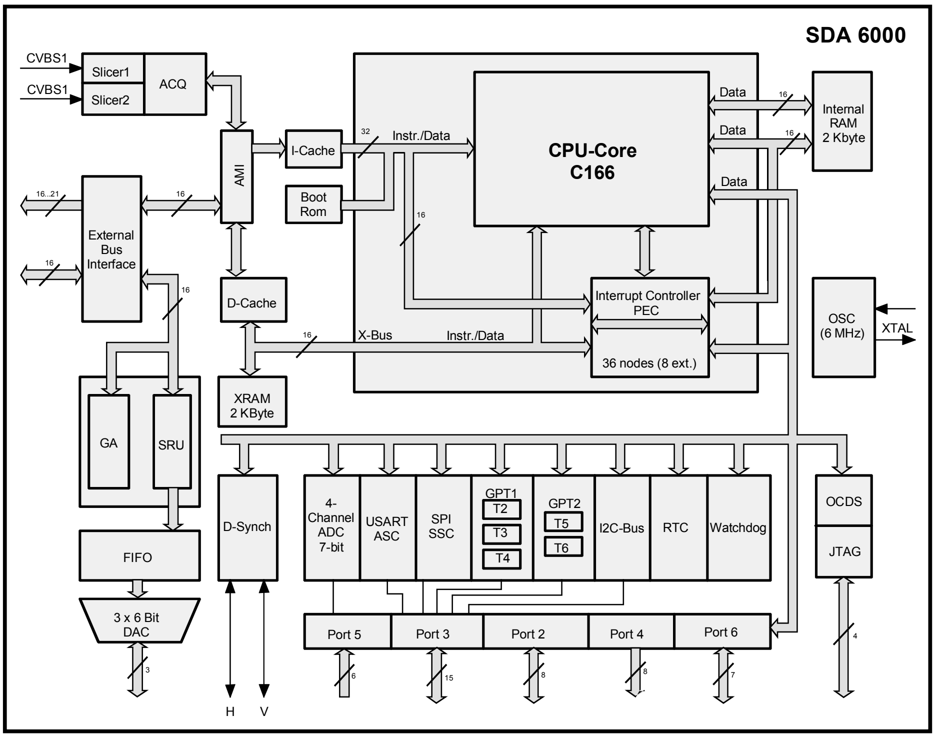
Via Q 2823 the signal reaches transistor Q 2862 on pin connector W 1076. Via W 1076 the IR signal is supplied to a connected online-box.

The pulse width for the RC 5 code of the remote control is about. 900 µs. If a connected Multi Media Component is operated with the Control@media IR keyboard, the data is not transferred with the slow RC 5 code, but with an RC MM code (MM-Multi Media) designed for fast data transfer. The pulse width for the RC MM code is 167 µs.

The pulse width of 167 µs requires an IR-receiver with a very short time constant. Therefore, in Multi Media devices a special IR receiver is used, which for operational purposes cannot be replaced by one from a normal TV set.

4.1.3 The SDA 6000 central control unit

A Siemens SDA 6000 is used in the Q 2500 chassis for control of device functions. This 16 bit processor is a development of the C 166 family of single chip CMOS microcontrollers. It combines excellent CPU characteristics of up to 8 million computation operations per second with high functionality, flexibility and high capacity input and output ports. The SAD 6000 has 5 Ports (Port 2 – Port 6) with a total of 44 inputs and outputs. It was designed especially for applications, where cost plays a critical role. This makes the processor suitable for use in colour TV sets.


SDA 6000
CVBS1
CVBS1
Slicer1
Slicer2
ACQ
AMI
I-Cache
Boot Rom
32
Instr./Data
CPU-Core C166
Data
Data
Data
16
16
Internal RAM 2 Kbyte
16..21
16
16
External Bus Interface
16
16
D-Cache
16
X-Bus
Instr./Data
Interrupt Controller PEC
36 nodes (8 ext.)
OSC (6 MHz)
XTAL
XRAM 2 KByte
GA
SRU
FIFO
3 x 6 Bit DAC
3
D-Synch
H
V
4-Channel ADC 7-bit
USART ASC
SPI SSC
GPT1
T2
T3
T4
GPT2
T5
T6
I2C-Bus
RTC
Watchdog
OCDS
JTAG
4
Port 5
Port 3
Port 2
Port 4
Port 6
6
15
8
8
7

In the Q 2500 chassis the processor must fulfil the following functions:

- Oscillator for generation of the CPU cycle frequency.
- Generation of the clock frequency for the bus systems.
- Processing of the RSIG signals and local operation commands.
- Generation of the I²C bus systems for control of the HF/IF units, processing of pictures, video text, PIP and audio, for communication with the memory IC, the SAT receiver unit and the interface selection.

- Control of LED's for operating and standby display.
- Creation of further switching processes, e.g. ON/OFF, AV transfer, etc.
- Simulation of a clock synchronised by VPS-information.
- Timer function for programmable disconnect time and recording timer.
- Code converter for IR commands for the remote control of a video recorder via the AV voltage switching line and the Dolby surround unit.
- RS 232 for communication with the online as well as the DVB module.
- Digital Link Plus Control for the 3 Euro/AV sockets

In order to fulfil the required tasks the following circuit components are combined in one chip:

- C 16 core with CPU and interrupt controller
- 2 kByte XRAM as working memory
- Interface for the external ROM
- Quarz controlled clock generator
- Interface for the three I2C buses
- Multifunctional timer
- IR decoder
- ON/OFF Flip-Flop
- Reset circuit for internal reset
- Reset circuit for external IC's.
- Ports P2 to P6 with 44 input and output pins.

Many of these functions are implemented not by the hardware of the processor, but by the Loewe-specific software.

4.1.4 Reset

For correct functioning of the device, various reset pulses are necessary. The first required is a reset on pin 73 for the SDA 6000, as soon as its operating voltage U3.3 is available and the 6 MHz system cycle has run. This reset is produced by I 2941. After this reset the SDA 6000 starts to operate and implements and emits control commands.

The microprocessor also has a reset on pin 8, produced by I 2946, if the circuit power supply has run and all IC's have an operating voltage. This reset is retarded in SDA 6000 and then emitted from pin 100 to the digital IC's.

RESET digital component input pin 8
The reset for this input is formed by a steep positive flank. As U3,3 is the last voltage switched by the power supply unit, this reset is coupled to the voltage. The reset pulse is created in I 2946 and is present on pin 8 of the microprocessor, if all IC's in the chassis have an operating voltage. SDA 6000 can then begin controlling the IC's. In addition the processor also reacts, if the reset is not present on pin 8 or during operation. Normally 5 V is always felt on a reset input, provided the device is fully switched on.

RESET digital component output pin 100
Via this pin the microprocessor sends the reset to the other circuits. This is coupled to input pin 8. In this way the processor can monitor the reset, and for transient voltage failures can prevent, the level on the reset line collapsing. On the other hand, the circuit also makes it possible for the SDA 6000 to emit a software controlled reset on pin 50 during operation

In standby and on start up L level is initially felt on pin 100. Not until the SDA 6000 switches pin 100 to H level, does the L/H flank produce the reset for the IC's. During operation the reset inputs must be held permanently at H level, otherwise the working register will be deleted.

This reset reaches MSP 3410 /pin 21, and the two VCP 3230/33 /pin 15.
All other IC’s either do not need a reset or generate it on switching on the operating voltage.

4.1.5 Creation of cycle frequency

The internal oscillator of SDA 6000 is synchronised with a 6 MHz quarz on pins 108 and 109. The cycle frequency for the bus systems is obtained from this frequency by internal distribution. They are from 70 to 400 kHz respectively for the I²C bus systems. The cycle frequency is transferred under software control depending on the current function.

4.1.6 Operational commands

The SDA 6000 receives operational commands as serial data information by RSIG signal on pin 9. The local operating commands are applied to the CCU on pin 126 as various voltage values.

Pin 126 operates as an ADC with 6 bit resolution. By various voltage dividers on the three operating unit buttons, various voltage levels are produced.
The voltage levels are digitised by the ADC, and based on the measured values the CCU issues the appropriate commands.

The following voltages are produced by manipulation of the various buttons:

-
- “+“ button - 0.5 V
- “-“ button - 1.1 V
- “ “ button - 1.8V

The overtravel contact is connected to pin 93 of the CCU.

4.1.7 LED display

The red standby LED is controlled via pin 96 of the CCU. In operation the remote control commands in RC5 code are acknowledged by transient illumination of the LED. For standby operation the pin is set to the H level and transistor Q 2853 thereby conducts, whereupon the LED illuminates. The ON LED is controlled via pin 78 with the ON/OFF-command. When the power supply is switched on this line is set to the L level, whereby the green ON LED also illuminates. SAT standby operation is indicated by illumination of the two LED’s.

4.1.8 ON/OFF function

If a switch-on command is present, the output ON/OFF, pin 78 of the CCU is set to L level. This blocks transistor Q 8111 in the standby power supply, whereupon Q 8114 conducts and attracts the relay. The system voltage is able to reach the main power supply, which begins to operate.

The device starts operating at the selected program location. The output is once again set to H level by an off command.

With an ON/OFF command the two transistors Q 2961 and Q 2966, which form part of the mute circuit, are switched, thus suppressing input and output noises.

4.1.9 Protective circuit

In order to avoid excessive high voltage, c.r.t. defects or other serious damage due to faults in the vertical deflection, caused by excessive beam current, the device is switched to standby. In addition, pin 94 of the CCU is set to H level. In normal operation L level is present (see description basic board Section 5.2 – 6.2).

If an error occurs – H level on pin 94 of the CCU - the CCU swtiches the device after 2 seconds to standby operation.

4.1.10 AV operation

The circuit is designed so that AV operation with switching voltage on programme locations can be programmed.

Setting is implemented in the menu under connect AV device.
The menu makes clear the exact procedure for setting up or you can refer to the overview in the operating instructions. Monitoring of the switching voltage on pin 8 of the AV socket is implemented via transistors Q 2737/Q 2726 and Q 2746 for AV1/AV2 and AV3. The three emitter followers are connected respectively via voltage dividers to pins 125/124 and 127 of the CCU.

In accordance with the Euro/AV standard, pin 8 of the AV socket is defined as 6V (16:9 operation) and 12 V (4:3 operation) AV operation.

The CCU monitors these voltages on its AV pins. By division of the respective voltages 6V = 1.3V and 12V = 2.6V on the pins of the CCU. If a switching voltage is detected by the CCU, this switches over to AV operation on corresponding menu selection.

- **IR signals**

For the remote operation of VTR devices via the TV-IR receiver the RSIG signal is applied to the Euro sockets pin 8.

For this two signal paths are provided. In normal and standby operation SDA 6000 pin 9 at H level switches transistor Q 2823, and pin 97, which is also on the signal path, is made high-resistant from SDA 6000, to avoid interference. Via Q 2823 and I 2716 the RSIG signal is passed on to the transistors for socket selection. Use of the recorder remote control is necessary for this.

There may be applications, however, for which the video recorder remote control is not available and the TV remote control emits another code that the recorder does not understand. For this a video menu is provided in chassis Q 2500, which is called up in the remote control with “V=“. This allows the basic functions of the recorder to be used. If for “Connect video devices“ three devices are selected, they can all be controlled independently of each other.

In this operating mode the RSIG signal present on pin 5 of the CCU is controlled internally via a code converter and then output via pin 97 of SDA 6000, which is now low resistant. The other signal path is identical with the first possibility.

The code converter changes the RC 5 data words of level 0, as they are delivered to the IR receiver, to those of level 5, with which the video recorder operates. Secondly, the code converter changes the RC 5 command into the corresponding data word of the NEC code. Thirdly, the RC 5 commands are converted into the Korythso code.

The three data words, both RC 5 of level 5, as well as the NEC code word and the Korythso code word, are emitted serially by SDA 6000 pin 97. This means that remote control of recorders that operate with RC 5, NEC or Korythso code is possible.

Of course, a recorder must be used that can process the remote control signal coming from the AV switching voltage line. For this most Loewe recorders have a converter.

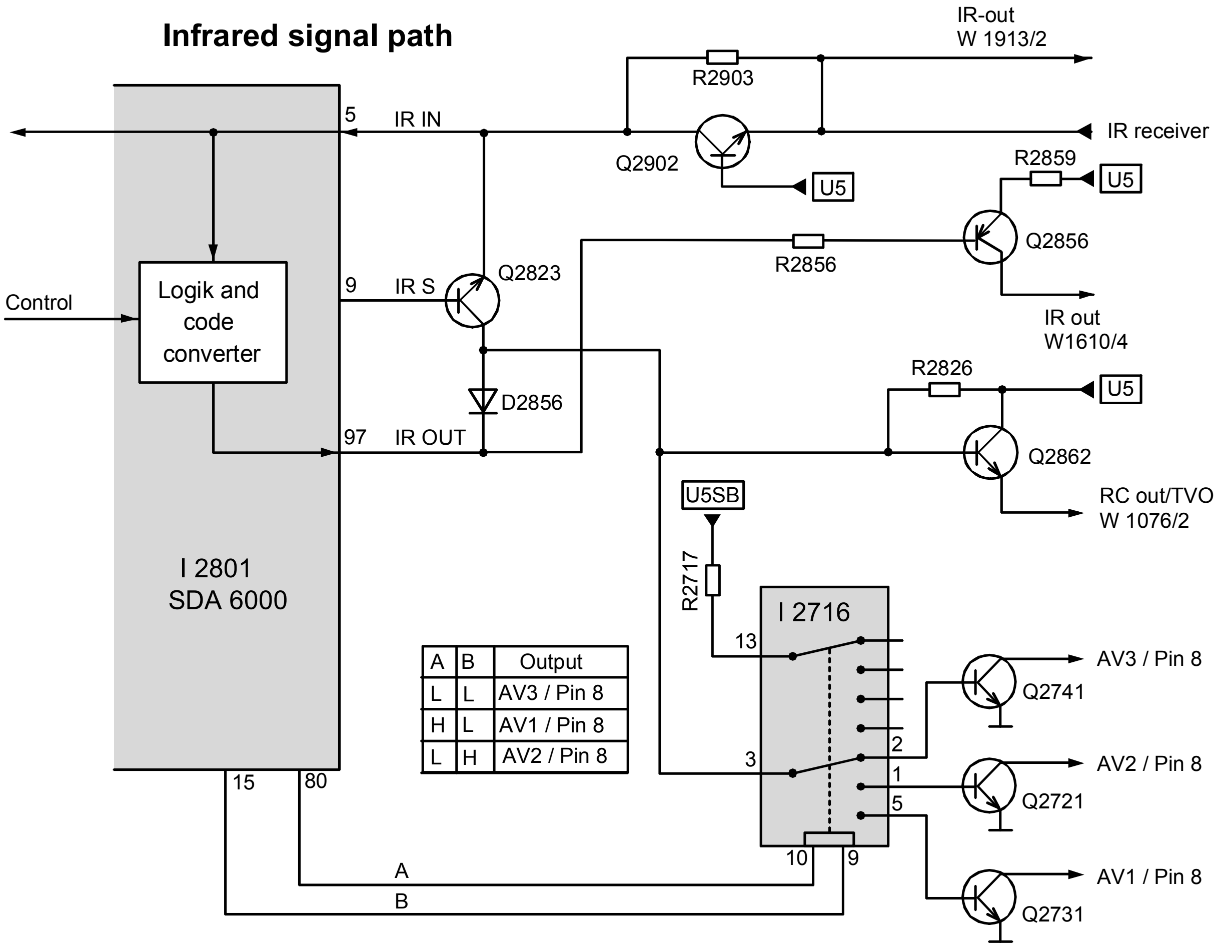
During output of the converted IR commands transistor Q 2823 is blocked with L level on pin 9 of the CCU. This prevents these signals being affected by IR signals from the receiver on the operating component.

In order to achieve separate operation of the three devices connected to the two Euro sockets, the circuit also contains RSIG signal switching controlled by the CCU.

This switching is implemented by multiplexer I 2716. The IC is controlled by the CCU via the outputs pin 15/80. According to the status, see table, the IRIN/IROUT signal is switched to the respective Euro/AV socket.

An optional online module can be controlled by transistor Q 2862.

Infrared signal path


IR-out
W 1913/2
R2903
5
IR IN
IR receiver
Q2902
U5
R2859
U5
Q2856
R2856
Q2823
9
IR S
Control
Logik and code converter
IR out
W1610/4
R2826
U5
D2856
97
IR OUT
Q2862
U5SB
RC out/TVO
W 1076/2
R2717
I 2801
SDA 6000
I 2716
13
AV3 / Pin 8
Q2741
3
2
1
5
AV2 / Pin 8
Q2721
15
80
A
B
10
9
AV1 / Pin 8
Q2731

A	B	Output
L	L	AV3 / Pin 8
H	L	AV1 / Pin 8
L	H	AV2 / Pin 8

The software for the RSIG signal switching is fitted with a load memory function. If there is no information about which socket should be used RSIG is applied to AV 1. If another socket is selected, the signal is then applied to this socket. If no socket is selected, the signal is applied to the one last used. This is true also for standby.

4.1.11 SAT standby

In order to create a situation where a video machine can also receive signals from the SAT receiving unit, which is integrated into the unit, without the TV set needing to be in operation, the horizontal output stage in this operating mode is switched off. This is achieved by an H level emitted via pin 79 of the CCU. This switches transistor Q 2951 and the horizontal control pulse from the video/deflection processor TDA 9332 is lead to earth.

As both the vertical and the RGB output stage obtain their operating voltage from the diode split transformer, this allows the entire c.r.t. to be switched off and the power input in this mode to be reduced. In normal operation pin 79 of the CCU is at L level and transistor Q 2951 is high resistance.

The c.r.t. is switched off when:

a) a timed recording for a video recorder is being processed in the TV set.

b) on switch off using the remote control, if previously, via the video menu, a recorder has been set to record.

c) on switch off using the remote control, if previously overplaying between the sockets of the TV has been activated.

d) Radio – operation is activated (after 20 sec.).

In all these cases all other stages of the chassis are fully operational. Except for d) the sound in the MSP 3410 is switched off via the I²C bus.

4.1.12 SAT unit control

Control of the Sat/TwinSat unit is implemented by the CCU via the I²C-Bus 2.

The SAT unit VI used is also able to control appropriately equipped switch boxes or LNCs via DiSEqC Level 1 (Digital Satellite Equipment Control). In this system pulse modulation of the 22 kHz signals allows data to be exchanged between receiver and peripheral devices. This means that the current different LNC supply voltage switching information, 22 kHz and control function will be replaced and simplified by separate control lines.

In the standard, a logical 1 is defined as 11 periods of 22 kHz signals (0.5 ms) followed by a 1 ms pause (22 periods). The logical 0 is represented in reverse, i.e. 22 oscillations (1 ms) and then a 0.5 ms pause (11 oscillations). For this, each bit requires 1.5 ms for the transfer, which corresponds to a maximum transfer speed of 666 bits per second. After each transferred telegram, there must be a pause of at least 6 ms (132 periods).

Control is implemented according to the Single Master - Single/Multi Slave principle. Master is always the SAT receiver, and the external components (LNC multiswitch, etc.) are the slaves. Therefore, each communication from the receiver is started and the external components can only transfer data, after they have been requested to do so by the master.

A command from the master contains a 1 byte frame, a 1 byte address, a 1 byte command and 1 or more bytes of data. The responses consist of a 1 byte frame and 1 or more bytes of data. Each byte is always followed by a parity bit (P) for error checking.

The frame byte determines, whether the data is sent by the master or the slave. The address byte contains the information that determines which peripheral module (switchbox, LNC ....) is addressed. The command byte determines which switching function is to be implemented (selection LNC, level switching ....). In the data byte additional information can be exchanged. There is still enough free space in the DiSEqC command set for future requirements. This means that the system has built in futurability.

For the DiSEqC control the SDA 6000 has an input and output respectively. Communication with the SAT unit in the device is via a common line on connector W 1211, pin 7 on the basic board and from there via W 250, pin 8 on the SAT unit.

Pin 90 of the CCU is used as an output for the control of peripheral devices. The 22 kHz-signal on the SAT unit is switched using the H level. By switching between the L and H level the 22 kHz is switched by the SAT unit for the required period and a command is then issued via the coaxial cable.

If the SDA 6000 is waiting for data from a peripheral device, then the 22 kHz must be switched at L level on pin 90. The device addressed dampens the 22 kHz signal for the required period by changing the input impedance, so that the data can be transferred to the SAT unit of the TV set. The SAT unit changes this signal into L and H pulses of the same duration, which are applied to connector W 1211, pin 7 on the signal board. The signal is inverted in transistor Q 2831. The DiSEqC information is then made available to the SDA 6000 on pin 7.

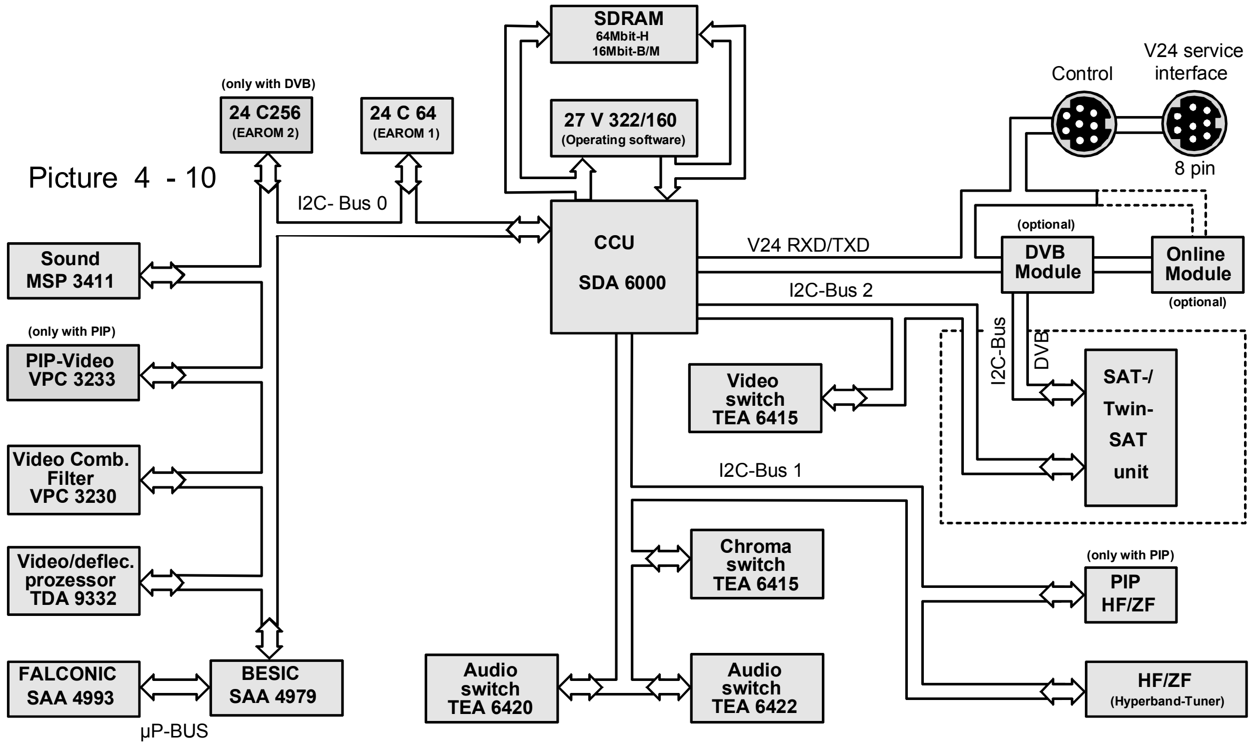
4.2 Bus systems in Q 2500 chassis

Several bus systems are used in order to implement the large number of switching and control functions of the Q 2500 chassis in a reasonable time, and for error-free addressing of the ICs.

For this the SDA 6000 generates three I²C-bus systems with which the memory IC, the control ICs for the HF/IF component, the ICs on the SAT unit, the converter for video and audio, the building levels in the video section, for PIP and multi-sound processor are controlled
The I²C bus systems 1 and 2 on the other hand operate with a common clock line and separate data lines. The I²C bus system 0 operates as usual with separate data and clock lines.

In all I²C bus systems there is constant data traffic. If the Bus Stop command is issued or the device is started with the Power On command, the bus lines are then set to 5 V d.c.

Q 2500/H bus systems


SDRAM
64Mbit-H
16Mbit-B/M
(only with DVB)
24 C256
(EAROM 2)
24 C 64
(EAROM 1)
27 V 322/160
(Operating software)
Control
V24 service interface
8 pin
I2C- Bus 0
CCU
SDA 6000
V24 RXD/TXD
I2C-Bus 2
(optional)
DVB Module
Online Module
(optional)
Sound
MSP 3411
(only with PIP)
PIP-Video
VPC 3233
Video Comb. Filter
VPC 3230
Video/deflec. prozessor
TDA 9332
FALCONIC
SAA 4993
BESIC
SAA 4979
µP-BUS
Video switch
TEA 6415
I2C-Bus
DVB
SAT-/ Twin- SAT unit
I2C-Bus 1
Chroma switch
TEA 6415
(only with PIP)
PIP
HF/ZF
Audio switch
TEA 6420
Audio switch
TEA 6422
HF/ZF
(Hyperband-Tuner)

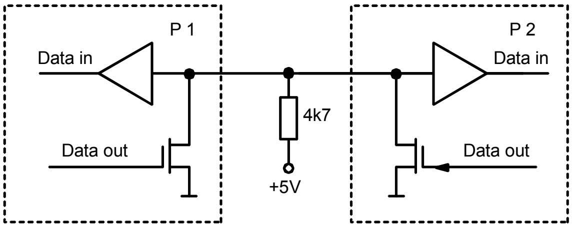
Picture 4 - 10

4.2.1 I²C bus systems

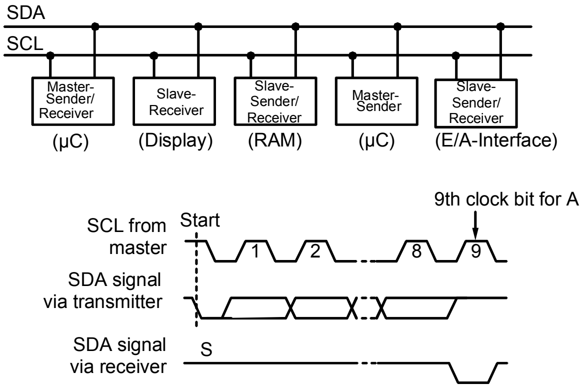
The I²C bus is a two-wire bus system consisting of a DATA line and a clock line. This bus system permits the serial and bi-directional exchange of communication between several microprocessors and peripheral ICs that possess an I²C bus interface. This means that the number of connections is reduced, which results in a simplified switching structure, and increased reliability (fewer solder points, connections, contacts, etc.).

Via pull-up resistors, both lines are in a state of rest (i.e. no data transfer) at H level. Data transfer starts if a clock line is "High" and a negative flank (H > L) appears on the DATA line (Start condition). Evaluation of the data occurs during the H level of the clock pulse.

Data inputs/outputs in I2C bus


P 1
Data in
Data out
4k7
+5V
P 2
Data in
Data out

The end of data transfer (Stop condition) occurs on signalisation of a positive flank (L > H) on the DATA line and concurrent H level on the clock line.



Up to 400 kbit/s can be transferred via the I^{2}C bus interface of the SDA 6000. The data and clock impulses are switched by software switching logic to the respectively required bus connections.

The CCU operates on its I2C bus outputs with a level of 3.3 V. The other ICs and components operate with TTL level. Adaptation of the CCU level to the TTL level is by transistors Q 2883/86/88/91 and Q 2893.
The following functions are controlled via the I^{2}C bus systems:

I^{2}C bus 0 with SDA 0 and SCL 0

Only the EAROM I 2931 is connected to the I^{2}C bus 0. This memory contains all start values and customer specific values. The data is selected here on start up and when making adjustments or writing to the EAROM on shut down and for memory processes.

If a DVB module is retro-fitted the second EAROM I 2936 is also used. Programme data from 220 to 1470 is stored here.

- Multi-sound processor MSP 3410 to IF- and VF processing.
- The video processor VPC 3230, I 2271 for digitising of input signals and processing in the main signal path. It conducts the digital Y/UV signals to the I 491 memory.
- SAA 4979 for conversion of the digital Y and C signals into analogue Y, R-Y and B-Y signals and for the control of the digital 100 Hz processing with the two half picture memories and the SAA 4993.
- The video/deflection processor TDA 9332 for generation of the RGB control signals for the c.r.t. plate and for generation of the deflection pulse
- Video processor VPC 3233, I 2151 for PIP signal processing. The digitised Y/UV-signals are fed to the two PIP synchronous memories I 2161/71.

The I^{2}C bus has a maximum cycle rate of 400 kHz.

I^{2}C bus 1 with SDA 1 and SCL 1

Just like the I^{2}C bus 0, fixed pins are also provided for the I^{2}C buses 1 and 2 in the SDA 6000. Buses 1 and 2 operate with a common clock line and separate data lines. Data is switched to the respective line for the required bus in an internal transfer switch.

The following are connect to the I^{2}C bus 1:

- The tuning and transfer IC’s on the receiver units in the basic board.
- The transfer IC’s for video (1 x TEA 6415) and audio (TEA 6422 and TEA 6420) for the interface on the signal board.

The I²C bus 1 operates with a cycle frequency of 100 kHz.

I²C bus 2 with SDA 2 and SCL 1

The Sat or Twin Sat unit is controlled from the SDA 6000 via the I²C-Bus 2.

There are tuning ICs in the receiver unit. Generation of the tuning voltage and control of the band and standard transfer or LNC supply on the SAT receiver.

4.2.2 IC 24C64 memory

A 24C64 64 kbit memory is used. To distinguish this EEPROM from the similarly sounding EPROM it is given the designation EAROM.

In addition to system data for the digital ICs the EAROM also contains user specific data. This is programme related location data such as channel, reception range, standard, etc., as well as customer specific tuning values for brightness, volume and contrast, for example.

The 24C64 has a memory capacity of 65536 bits, and is organised into 8192 x 8 bits. The memory life is at least 10 years, with more than 1 million write and read actions guaranteed. Inputting and outputting of data is controlled by the SDA 6000 and implemented via the I²C bus 0. For this the CCU generates an 8-bit address word preceded by a start bit. The 8-bit value is composed of a 7-bit word for the IC address and one bit, containing the on or off command.

This address word is checked by the IC's connected to the system for conformity with the address words they hold, and receipt is acknowledged by an acknowledge bit from the appropriate IC. In the socket the master IC (SDA 6000) transfers the storage location address. This address consists of two 8-bit words, receipt of which is acknowledged by an acknowledgement bit for each bit respectively. If this occurs, the 8 data bits are transferred to or from the memory IC and receipt is confirmed by the appropriate IC.

Transfer of the data described is implemented via line SDA 0 and is synchronised by the clock on line SCL 0. After transfer of the last acknowledgement bit, the command "Input" sets the save procedure in motion. During the save procedure the inputs SDA and SCL of 24C64 are locked, in order to prevent any external interference with the memory during this time.

After the start up routine the system data is read from the memory by the SDA 6000 via the I²C bus and and then the data is transferred via the I²C bus systems to the appropriate digital IC's.

To prevent inadvertent deletion or overwriting of the memory on start up or shutdown, the Write Protect line pin 7 of the two EAROMs is connected via Q 2943 to the Reset line. In the start up and shut down phase, pin 7 of both EAROM`s is switched to the L level. Inadvertent deletion or overwriting is thereby prevented. In the operating state H level is applied to pin 7.

4.2.3 EPROM M 27 C 322

Device specific software is held in EPROM I 2926 as non-volatile data.

An IC with 32 Mbit memory is used. The memory is divided into 2097152 x 16 bit areas.

Data transfer from the EPROM to the computer is implemented via connections D0 to D16. The memory addresses, from which the data is recalled, are transferred previously via lines A0 to A 20.

4.2.4 SRAM

Data that is necessary for the functioning of the CCU is temporarily saved in the 64MBIT DRAM I 2916. Owing to additional functions in the EPG and DVB the internal RAM area in the CCU is no longer sufficient to store all the data required. Up to 3000 videotext pages are stored in this DRAM.

4.2.5 Search functions

On implementing the search function by pressing the appropriate button the SDA 6000 permits the SAA 4979, via the I²C bus, to output permanent blank in the blank stages. In this way the picture is sampled and using another command from the MSP, the sound as well.

The required frequency is communicated as a whole number multiple of 62.5 kHz from the SDA 6000 via the I²C bus to the tuning IC. From the tuner each set oscillator frequency is present as the actual value. It is sub-divided in the IC and compared to a reference frequency. The sub-multiple ratio is determined by C 161.

Using internal UP and DOWN pulses the tuning voltage is delayed until compatibility is reachd. The PLL engages and communicates this to the SDA6000 via the I²C bus. It then requests the VPC via the I²C bus for the available standardised synchronous signals. If synchronous pulses are present, the permanent blank is lifted. In the event that there are no synchronous signals, the SDA 6000 communicates to the tuning IC the next highest sub-multiple and the tuning procedure begins anew. The search procedure only stops when a transmitter is found. The SDA 6000 determines this by querying the VPC about the synchronous pulses present.

During the search procedure the channels are searched in ascending order within the selected standard. For the PAL B/G, SECAM East, NTSC Europa and SECAM L standards, cable channels are also searched.

On transfer from one FS band to another, the corresponding band switching information is automatically switched at the same time. Depending on the device settings changing of standards is carried out either automatically or manually.

If no transmitter is detected in the selected channel on the normal frequency, the channel is searched from its lower limit in 1 MHz steps. If a transmitter is still not found, the system jumps to the next highest channel.

4.2.6 Storage

If a channel has been found and the correct standard set by the search procedure or direct input of a channel, it can be saved to any programme location between 00 and 220. In addition, all tuning and switching information is written to the EAROM via the I²C bus.

4.2.7 Programme recall

For programme recall the required programme number is input to the SDA 6000 via the remote control. Via the I²C bus it requests the EAROM to communicate the details of this storage location (division ratio, fine tuning, FS standard). This Information is passed via the I²C bus from the memory to the SDA 6000, which then passes it to the tuning IC in the tuner. The IC sets the band switching outputs to the required band and required standard and moves the tuner oscillator to the allocated frequency. The fine-tuning value is also considered with respect to the oscillator frequency and corrected by the AFC. The tuning remains on the required frequency, even when no transmitter is available.

4.2.8 System clock

A realtime clock is integrated into the SDA 6000 to enable timer functions for transmitters without videotext and timed SAT standby programming.

It consists of a computer-integrated time switch and the associated software forming part of the operating software. The synchronisation and setting of this internal clock is implemented by the appropriate videotext information.

It is therefore necessary on starting up the device to select a transmitter with videotext, otherwise clock setting has to be carried out manually.
In standby operation the clock continues to run.

The following logic is provided for setting the time:

- On switching on using the mains button the clock is set to 0.
- On reception of a videotext transmitter the clock is set within one minute.
- In operation the clock is permanently synchronised with the videotext time, so long as time is running in the text.
- If the time deviates by ± 1 or 2 hours, it is only on selection of program locations 1, 2 or 3 that it is set to the videotext time, to avoid time zone errors.

Note
If during operation the time is corrected manually, synchronisation with videotext time is no longer implemented. The time is then running free and after a few days large deviations could occur. Synchronisation of the clock with the videotext can then only be implemented by re-setting the processor, i.e. after switching off and on the mains switch.

The system clock controls the recording of a connected videorecorder, i.e. the switch off and switch on time. For these functions it is important that the system clock is correctly set. If no transmission with videotext is received, the time and date can be manually set.

Note:
The switch off timer can only be completely deactivated with “--:--“. If “00:00“ is set, then at 24.00 the device switches to standby.

4.2.9 Control of signal processing

The SDA 6000 microprocessor controls and monitors all signal processing. To do this it is linked to the signal processors via the I²C bus system. Each processor has an integrated I²C bus interface and a working memory. The content of the working memory is deleted on shut down. This means that the data required by the processors must be reloaded during the start up routine.

This data is stored ex-works in a non-volatile form in the memory IC of the EAROM 24C64. This tuning data is also already stored in replacement EAROM's and therefore only requires minor corrections if an IC is changed. The cost is about the same as current tuning costs after a change of chassis and can be implemented via the FB sensor. A computer can be used for tuning, as detailed in number of specialist magazines, but does not save any time.

On start up C 161 reads the tuning values from the memory via the I²C bus and enters them into the working memory of the appropriate processors via the I²C bus. Apart from the static data that the system requires for functioning, data for the picture amplitude, picture geometry, picture width, etc. is contained in this entered information. It also includes the customer specific tuning information such as brightness, colour saturation, volume, etc. The latter can be changed at any time by the customer, and by using the memory function the changed values can be entered into memory in a non-volatile form.

Changes to these values will be communicated via the I²C bus to the appropriate processors during the adjustment procedure and can then be adjusted to the required values. All data read in on start up as well as data changed by the customer during operation, is checked during operation by continuous communication between the SDA 6000 and the signal processors. If deviations occur these are corrected immediately.

This is particularly the case for time-dependent tuning values such as, for example, white value, black value and c.r.t. leakage current. For this reason in devices incorporating the Q 2500 chassis, ageing of, for example, the c.r.t. only becomes apparent when the scope of control is exhausted and the c.r.t. is totally worn out. In our chassis these dynamic tuning values are therefore subject to special treatment. The values for these functions held in the memory are automatically updated to the current values on each save procedure. In this way updating of the current wear-determined values on start up is not necessary, which the end user will surely notice.

For control and adjustment procedures via the remote control and local operating buttons the changes are initially made only in the working memories of the appropriate IC's and in the register of the SDA 6000. Normally the saving of values in EAROM must be implemented by an additional command (usually the OK button). If the remote control is used to switch the device to standby, then the data in the register of the SDA 6000 is available when the unit is restarted. The data within the unit, such as the last volume level set is retained.

When the unit is switched off at the mains the microprocessor register is deleted, and on the next start up only the EAROM data is available. So that specific settings are retained, the EAROM has an area for “Last memory“ data. On shut down the data is saved to this area (e.g. last programme location). In addition, a few seconds after programme location change the set programme location is saved in the Last Memory data area.

4.2.10 Service mode

In order to carry out chassis tuning the device must be placed in the required service mode. The remote control can then be used to call up all the necessary functions for chassis tuning, with a few exceptions. After successful tuning the new values must be saved.
The exact functions available in the service mode can be found in the service instructions for the appropriate device.

4.2.11 Video text

In the 100Hz TV set system the videotext function and the production of overwriting OSD is now the responsibility of the CCU SDA 6000.
For this reason the FBAS signal is fed to pin 117 of the CCU. The CCU controls full data separation and memory administration internally. The VT pages are then stored in the SDRAM I 2916.
The VT information as also the OSD overwriting are applied to pins 112/113/114 of the CCU as RGB signals.

4.2.12 Picture signal processing

Picture signal processing is implemented by highly integrated modern circuits that have been used for the first time by Loewe, in similar IC variants, in the Q 2300 chassis generation. The highly integrated IC's mean that for the two 100 Hz generation chassis Q 2100 and 2200, the 100 Hz module necessary for the signal board can be dispensed with. All the ICs necessary for signal generation can be fitted without problem on the component side of the signal board. This also provides much simpler faultfinding, which is also favoured by the clear signal flow.

The picture signal processing is mainly in digital form, with ICs from different manufacturers being used. The video processor VPC 3230 developed by Intermetall is used in the front end. A Philips IC set is used for the 100 Hz processing. This IC set was reduced by higher integration to two chips and the two half picture memories. The new SAA 4993 in the Q 2500 chassis is used for the latter. The microcontroller, the memory controller, the 50/100Hz memory and the DAC are all combined in the SAA 4979 (BESIC). In the back end of the Q 2500 chassis there is a new processor that contains both the video and the deflection function. The Philips TDA 9332 video/deflection processor has the item number I 2521.
In addition, the Q 2500 chassis can also be optionally equipped with picture in picture processing. This enables one or three small pictures to be inserted (see picture in picture). A split screen is also possible for the first time.

4.2.13 Components for signal processing

The following is a short overview of the components and their functions as used for signal processing. The signal path, pin-assignments and the exact functioning is explained later. The processing is also described in detail later.

- VPC 3230
  Video processor
  8-bit ADC for FBAS and Y/C signals
  4-line comb filter
  Multi standard colour decoder for PAL/ NTSC and SECAM
  20.25 MHz clock generator
  Letterbox detector
  Line compression and decompression
  for zoom modes

- 2 x MSM SAA 4955 HL
  Half picture memory

  The two half picture memories are necessary for the picture
  signal intermediate storage and
  processing.

- Philips SAA 4993
  (Falconic: Field and line rate converter
  with noise reduction IC)

  Dynamic noise suppression set by user.
  Suppression of intermediate line flickering DLC (Digital Lineflicker Reduction).
  Suppression of motion in horizontal movement, DMI (Digital Motion Interpolation).
  Suppression of motion in movies, DMM (Digital Movie Mode).
  Line interpolation, in order to display 576 lines in all zoom functions, DLI (Digital Line Interpolation).

- SAA 4979
  (BESIC: Back End System control IC)
  The integrated half picture memory is for
  50/100Hz conversion.
  Control of 100 Hz signal processing
  Synchronisation of 32 MHz
  Peaking and CTI (Colour Transient
  Improvement) to improve Y and
  chroma interfaces.
  Horizontal sampling
  DAC for Y, R-Y and B-Y

- TDA 9332
  (Video/deflection processor)
  Inputs for two separate RGB signals.
  PAL/SECAM and NTSC matrix for production of RGB signals.
  Colour saturation, brightness and contrast settings.
  Automatic Cut Off and leakage current control and setting.
  Beam current limitation circuit.
  RGB output amplifier.
  Production of V/H deflection control signals

4.2.14 Signal path

All FBAS or Y/C signals delivered by the receiving units, the three Euro/AV sockets of the front interface, are directed via the video matrix switch to the video processor VPC 3230. The FBAS or Y signal is led from pin 17 of I 1711, via the impedance converter Q 1814 to pin 73 of the video processor I 2271. The filter in the Y/FBAS path consisting of L 2259/57 and the associated capacitors has low pass characteristics. Frequency components over 7 MHz are efficiently suppressed by the filter. This prevents floating effects in the video signal, that may arise from the cycle rate of the ADC and residual signals from neighbouring channel. For Y/C operation the chroma signal moves from pin 14 of I 1721, via the emitter follower of Q 1824 to filter L/C 2266, which suppresses noise components, and then to chroma input pin 72 of 2271.

VPC 3230 is also equipped with two RGB input interfaces.

Pins 1-3 of I 2271 are connected directly to the Euro/AV socket 2 via the corresponding input filter. The associated fast-blank signal is applied to I 2271 on pin 79.

Q 2226 prevents the FB voltage exceeding 2.2 V and thereby damaging the videoprocessor. RGB operation via the Euro/Avc socket 2 is therefore also fast blank compatible. Y/U/V operation is also possible from the second RGB input from pin 4 of I 2271 , 5 and 6. The RGB signals are fed from the optimum DVB module or from the Euro/A socket 3 via this input. The same goes for the Y/U/V signals of the Euro/AV socket 3. The inputs 4, 5 and 6 from I 2271 are not fast blank compatible.

The video processor VPC 3230 digitises and fully processes the FBAS analogue input signals or Y/C signal. On the output there is a digital 8-bit wide luminance and an 8-bit wide demodulated chroma signal with its U/V components. The luminance and chroma signals are transferred in multiplex procedures via eight LM0-7 lines. The amplitude on the lines is 3.3 Vss. The associated cycle frequency is 27 MHz and is output from pin 27 on I 2271.
In SAA 4979 the luminance and chroma signals are led to a demultiplexer and read into the internal half picture memory. Selection results with the 100 Hz cycle rate of 32 MHz.

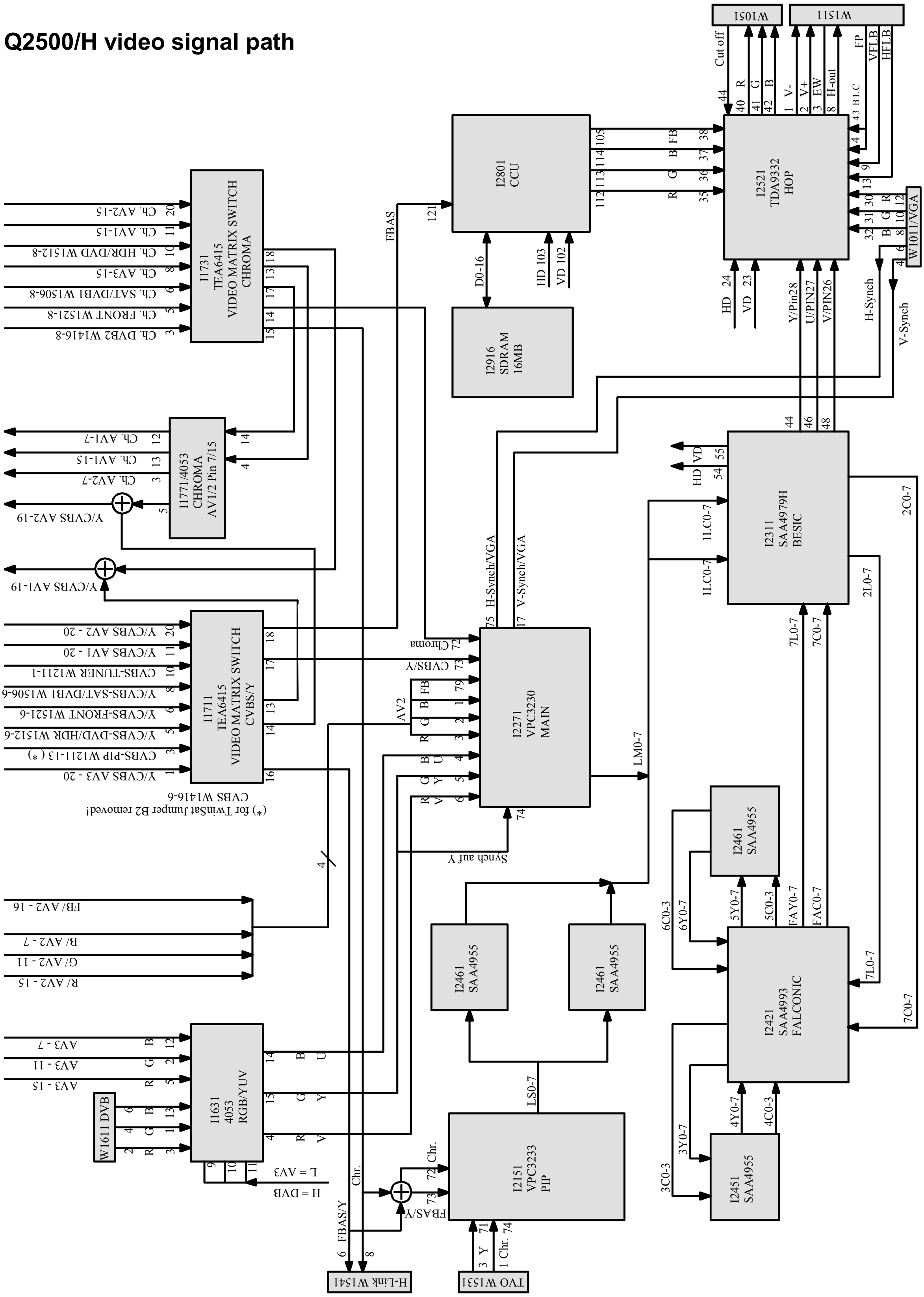
With 3 Mbit, slightly more than a half picture can be stored in intermediate memory, which permits continuous single and dual selection.
The next IC in the signal path, SAA 4993, is responsible for noise suppression and various interpolations. Noise suppression is implemented by signal from the output, which has already been processed, being delayed for a half picture by the second half picture memory and then mixed with the currently applied signal.

In addition, this IC suppresses the intermediate line shimmer. Line interpolation also occurs, so that 576 lines can be displayed in all zoom functions. Movements between the pictures are also interpolated, to ensure a continuous movement process over all half pictures.

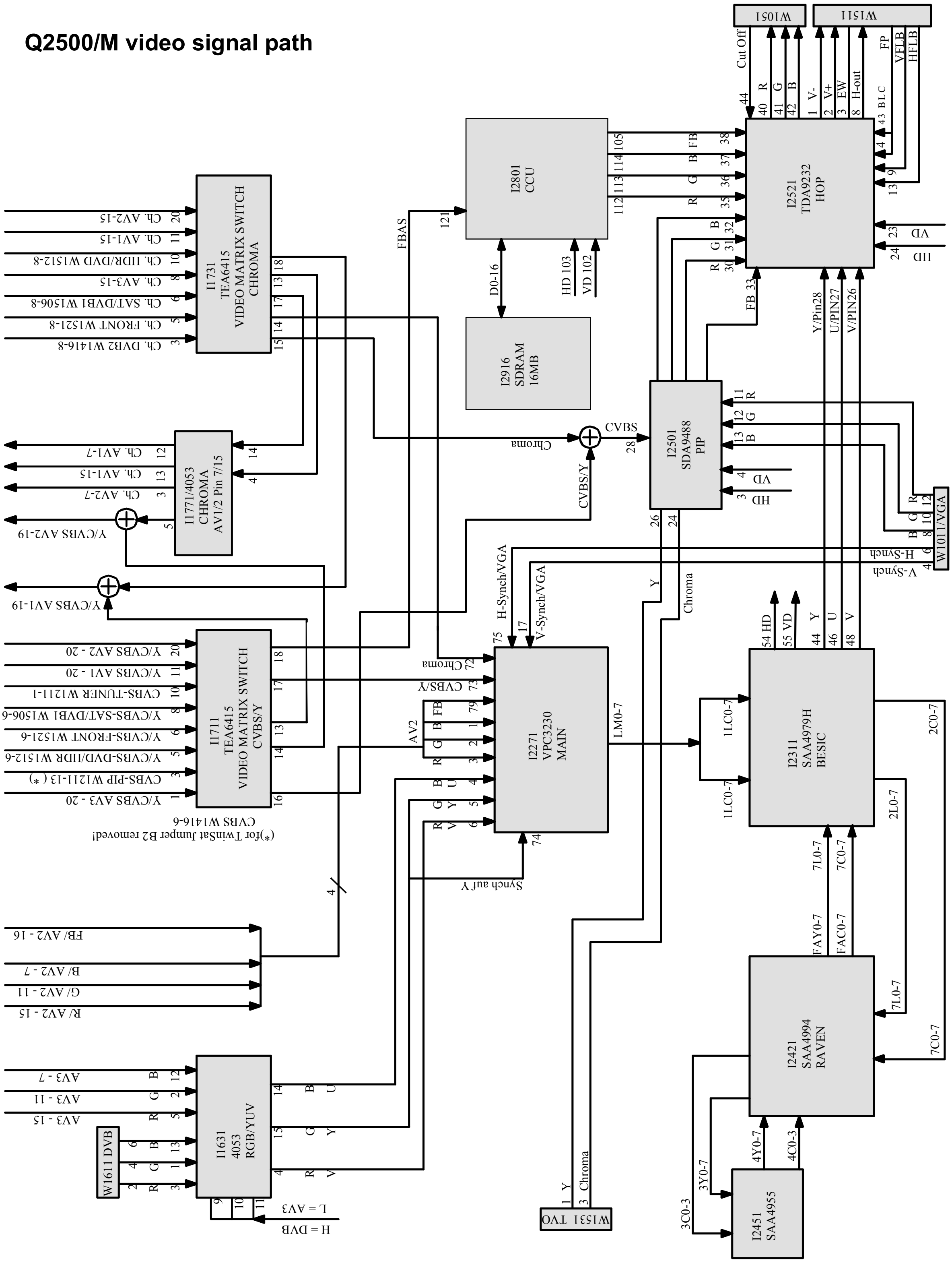
SAA 4979, which is the next IC in the signal path, is used mainly as a DAC and for the control of the digital 100 Hz video processing in the circuit.

In the chroma branch there is a circuit for improving colour transitions. It is used to increase the slope of the colour transition flanks in the differentiation and adder stages.

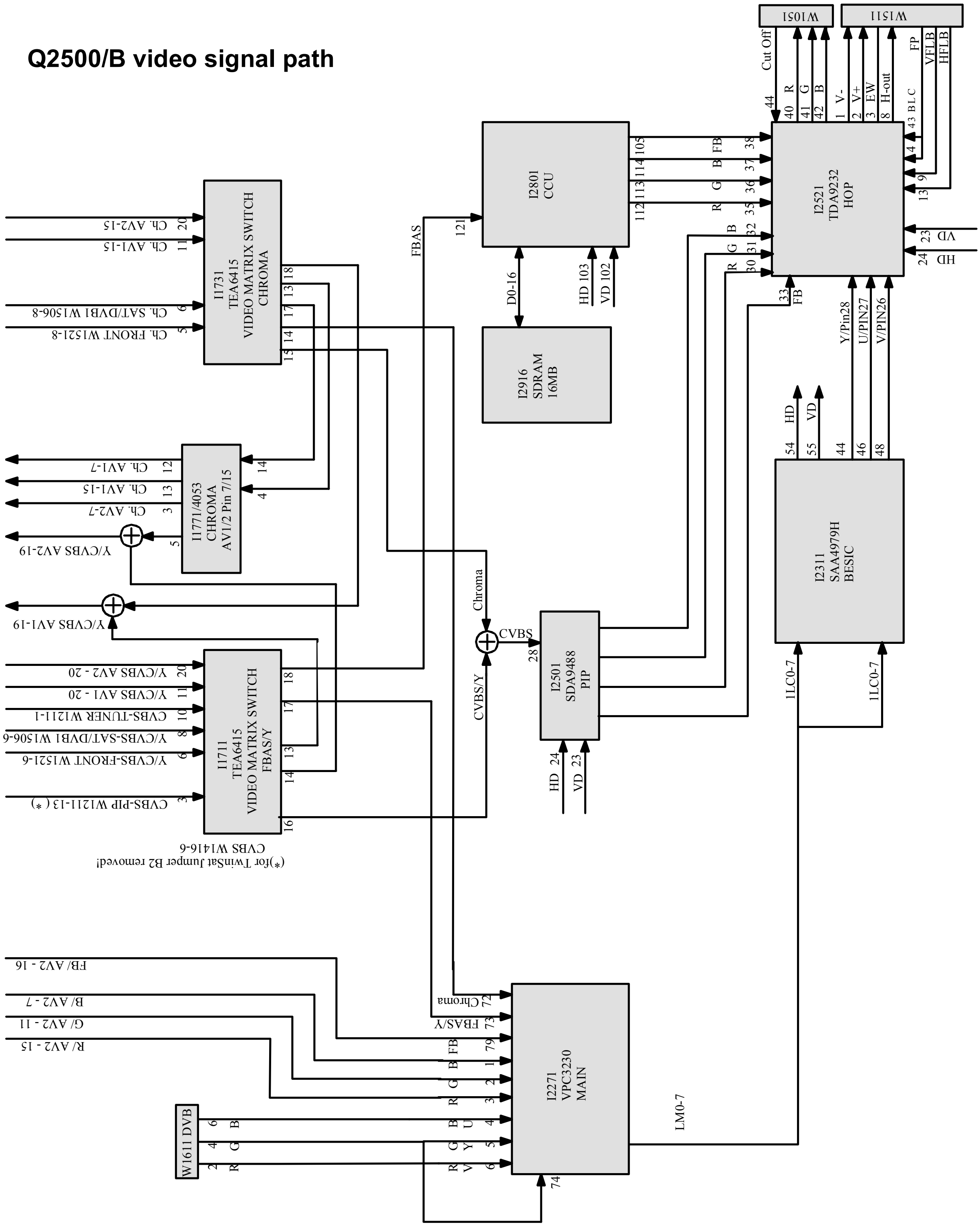
Q2500/H video signal path


W1051
W1511
Cut off
R
G
B
V-
V+
EW
H-out
43 BLC
FP
VFLB
HFLB
I2801
CCU
FBAS
D0-16
HD 103
VD 102
I2521
TDA9332
HOP
W1011/VGA
H-Synch
V-Synch
HD 24
VD 23
Y/Pin28
U/PIN27
V/PIN26
I2916
SDRAM
16MB
I1731
TEA6415
VIDEO MATRIX SWITCH
CHROMA
Ch. AV2-15
Ch. AV1-15
Ch. HDR/DVD W1512-8
Ch. AV3-15
Ch. SAT/DVB1 W1506-8
Ch. FRONT W1521-8
Ch. DVB2 W1416-8
I1771/4053
CHROMA
AV1/2 Pin 7/15
Ch. AV1-7
Ch. AV1-15
Ch. AV2-7
Y/CVBS AV2-19
Y/CVBS AV1-19
I1711
TEA6415
VIDEO MATRIX SWITCH
CVBS/Y
Y/CVBS AV2 - 20
Y/CVBS AV1 - 20
CVBS-TUNER W1211-1
Y/CVBS-SAT/DVB1 W1506-6
Y/CVBS-FRONT W1521-6
Y/CVBS-DVD/HDR W1512-6
CVBS-PIP W1211-13 (*)
Y/CVBS AV3 - 20
CVBS W1416-6
(*) for TwinSat Jumper B2 removed!
H-Synch/VGA
V-Synch/VGA
Chroma
CVBS/Y
AV2
I2271
VPC3230
MAIN
Synch auf Y
LM0-7
I2311
SAA4979H
BESIC
HD
VD
1LC0-7
2C0-7
2L0-7
7L0-7
7C0-7
I2461
SAA4955
5Y0-7
5C0-3
FAY0-7
FAC0-7
6C0-3
6Y0-7
I2421
SAA4993
FALCONIC
FB/AV2 - 16
B/AV2 - 7
G/AV2 - 11
R/AV2 - 15
AV3 - 7
AV3 - 11
AV3 - 15
W1611 DVB
I1631
4053
RGB/YUV
L = AV3
H = DVB
LS0-7
I2151
VPC3233
PIP
Chr.
FBAS/Y
I2451
SAA4955
4Y0-7
4C0-3
3Y0-7
3C0-3
H-Link W1541
TVO W1531
Y
1 Chr.

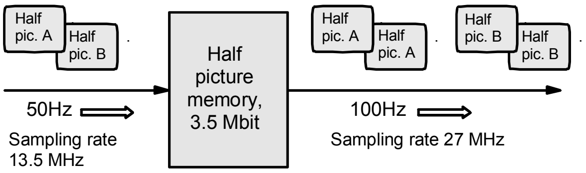
Q2500/M video signal path


W1051
W1511
I2521
TDA9232
HOP
I2801
CCU
I2916
SDRAM
16MB
I2501
SDA9488
PIP
I1731
TEA6415
VIDEO MATRIX SWITCH
CHROMA
I1771/4053
CHROMA
AV1/2 Pin 7/15
I1711
TEA6415
VIDEO MATRIX SWITCH
CVBS/Y
I2271
VPC3230
MAIN
I2311
SAA4979H
BESIC
I2421
SAA4994
RAVEN
I2451
SAA4955
I1631
4053
RGB/YUV
W1611 DVB
W1531 TVO
W1011/VGA
Cut Off
FBAS
D0-16
HD 103
VD 102
Y/Pin28
U/PIN27
V/PIN26
CVBS
Chroma
CVBS/Y
H-Synch/VGA
V-Synch/VGA
H-Synch
V-Synch
LM0-7
1LC0-7
2C0-7
2L0-7
7L0-7
7C0-7
FAY0-7
FAC0-7
4Y0-7
4C0-3
3Y0-7
3C0-3
Synch auf Y
AV2
Ch. AV2-15
Ch. AV1-15
Ch. HDR/DVD W1512-8
Ch. AV3-15
Ch. SAT/DVB1 W1506-8
Ch. FRONT W1521-8
Ch. DVB2 W1416-8
Ch. AV1-7
Ch. AV1-15
Ch. AV2-7
Y/CVBS AV2-19
Y/CVBS AV1-19
Y/CVBS AV2 - 20
Y/CVBS AV1 - 20
CVBS-TUNER W1211-1
Y/CVBS-SAT/DVB1 W1506-6
Y/CVBS-FRONT W1521-6
Y/CVBS-DVD/HDR W1512-6
CVBS-PIP W1211-13 (*)
Y/CVBS AV3 - 20
CVBS W1416-6
(*)for TwinSat Jumper B2 removed!
FB/ AV2 - 16
B/ AV2 - 7
G/ AV2 - 11
R/ AV2 - 15
AV3 - 7
AV3 - 11
AV3 - 15
H = DVB
L = AV3
FP
VFLB
HFLB
H-out
EW
V+
V-
BLC
HD
VD

Q2500/B video signal path


W1051
W1511
Cut Off
R
G
B
V-
V+
EW
H-out
BLC
FP
VFLB
HFLB
I2521
TDA9232
HOP
VD
HD
I2801
CCU
FBAS
121
105
114
113
112
B FB
R G
D0-16
HD 103
VD 102
I2916
SDRAM
16MB
Y/Pin28
U/PIN27
V/PIN26
FB
I2311
SAA4979H
BESIC
1LC0-7
I1731
TEA6415
VIDEO MATRIX SWITCH
CHROMA
Ch. AV2-15
Ch. AV1-15
Ch. SAT/DVB1 W1506-8
Ch. FRONT W1521-8
I1771/4053
CHROMA
AV1/2 Pin 7/15
Ch. AV1-7
Ch. AV1-15
Ch. AV2-7
Y/CVBS AV2-19
Y/CVBS AV1-19
Chroma
CVBS
CVBS/Y
I2501
SDA9488
PIP
HD 24
VD 23
I1711
TEA6415
VIDEO MATRIX SWITCH
FBAS/Y
Y/CVBS AV2 - 20
Y/CVBS AV1 - 20
CVBS-TUNER W1211-1
Y/CVBS-SAT/DVB1 W1506-6
Y/CVBS-FRONT W1521-6
CVBS-PIP W1211-13 (*)
CVBS W1416-6
(*)for TwinSat Jumper B2 removed!
FB/ AV2 - 16
B/ AV2 - 7
G/ AV2 - 11
R/ AV2 - 15
W1611 DVB
R G B
I2271
VPC3230
MAIN
Chroma 72
FBAS/Y 73
FB 79
74
LM0-7

100 Hz principle



In the Y signal path there is a peaking circuit. It is used to produce black/white edges on overshoots, which increases the sharpness of the picture. The height of the overshoot can be adjusted with the "Sharpness" operating function.

With three output side DACs analogue Y-, R-Y- and B-Y- signals are produced, which are then output on pins 44, 46 and 48.

Finally the Y- and colour difference signals are fed through low-pass filters to filter out interference pulses and the residue of digitisation.

The last IC is the TDA 9332 for the 100 Hz colour signal processing. It controls the RGB power output stages to the c.r.t plate.

The Y-, R-Y- and B-Y signals output on pins 26, 27 and 28 produce RGB signals using analogue matrix circuits.

The IC carries out further processing of analogue RGB signals (twice), CCU signals (once) and signals from the optional VGA interface or online module. Depending on the associated blank information, both the internally produced and the two RGB signals from a selection circuit are switched.

The following integrated modules are responsible for colour saturation, brightness and contrast setting. Control is via the I^2C bus from the CCU. The same is true for the white and black value setting. An automatic black value setting is also available. With this cutoff control, signs of ageing, e.g. the c.r.t, are corrected (see description of the RGB output stages).

The signals reach pins 40, 41 and 42 via the RGB output amplifier and are held there at 4 Vss for control of the speed modulator and the RGB output stages.

4.2.15 IC functions

The following paragraphs give a more detailed description of the functions of the ICs used for picture processing.

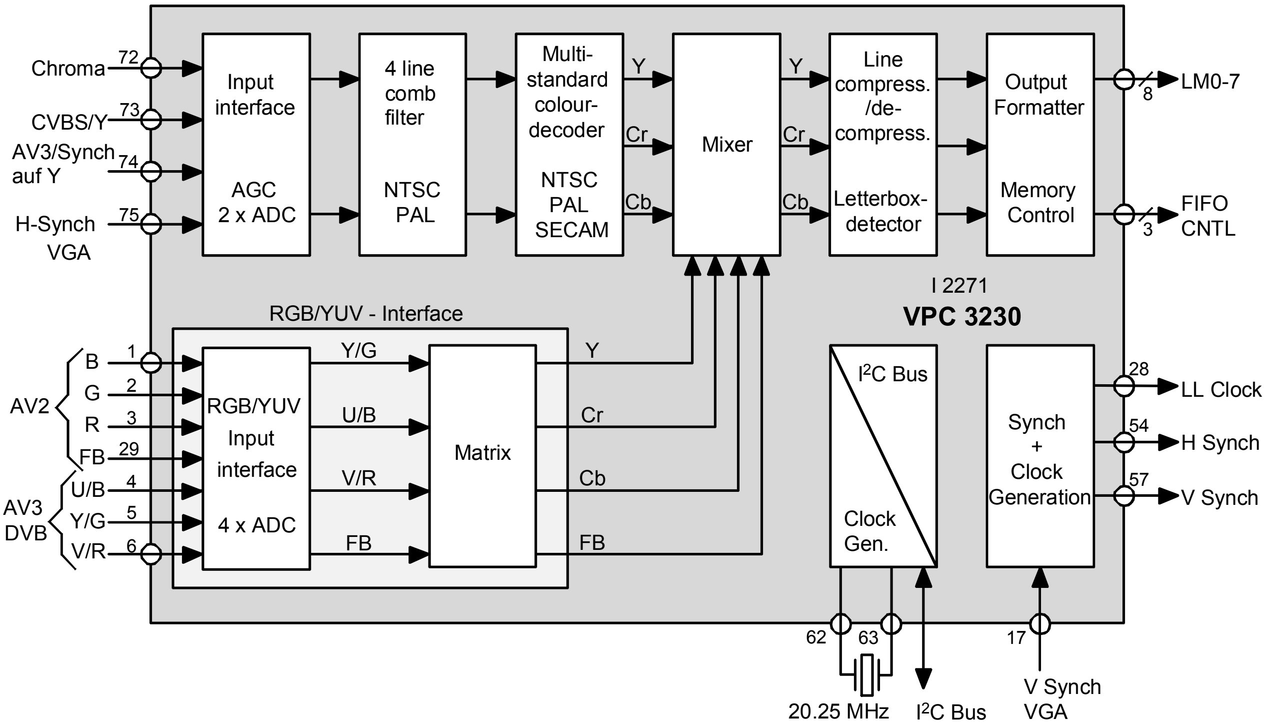
In the descriptions, the processes are shown in a much-simplified form. The operations necessary for the execution of the functions are inevitably much more complex.

4.3 VPC 3230

Video processor

The VPC 3230 is a recently developed video processor from Intermetall in 0.8 µ CMOS-technology. The functions are contained in an 80 pin PLCC housing.

VPC 3230 block diagram


Chroma
72
CVBS/Y
73
AV3/Synch auf Y
74
H-Synch VGA
75
Input interface
AGC 2 x ADC
4 line comb filter
NTSC PAL
Multi-standard colour-decoder
NTSC PAL SECAM
Y
Cr
Cb
Mixer
Line compress. /de-compress.
Letterbox-detector
Output Formatter
Memory Control
LM0-7
8
FIFO CNTL
3
I 2271
VPC 3230
RGB/YUV - Interface
AV2
B
G
R
FB
1
2
3
29
AV3 DVB
U/B
Y/G
V/R
4
5
6
RGB/YUV Input interface
4 x ADC
Y/G
U/B
V/R
FB
Matrix
Y
Cr
Cb
FB
I²C Bus
Clock Gen.
Synch + Clock Generation
28
LL Clock
54
H Synch
57
V Synch
62
63
17
20.25 MHz
I²C Bus
V Synch VGA

The functions in the VPC 3230 can be roughly summarised into 9 blocks:

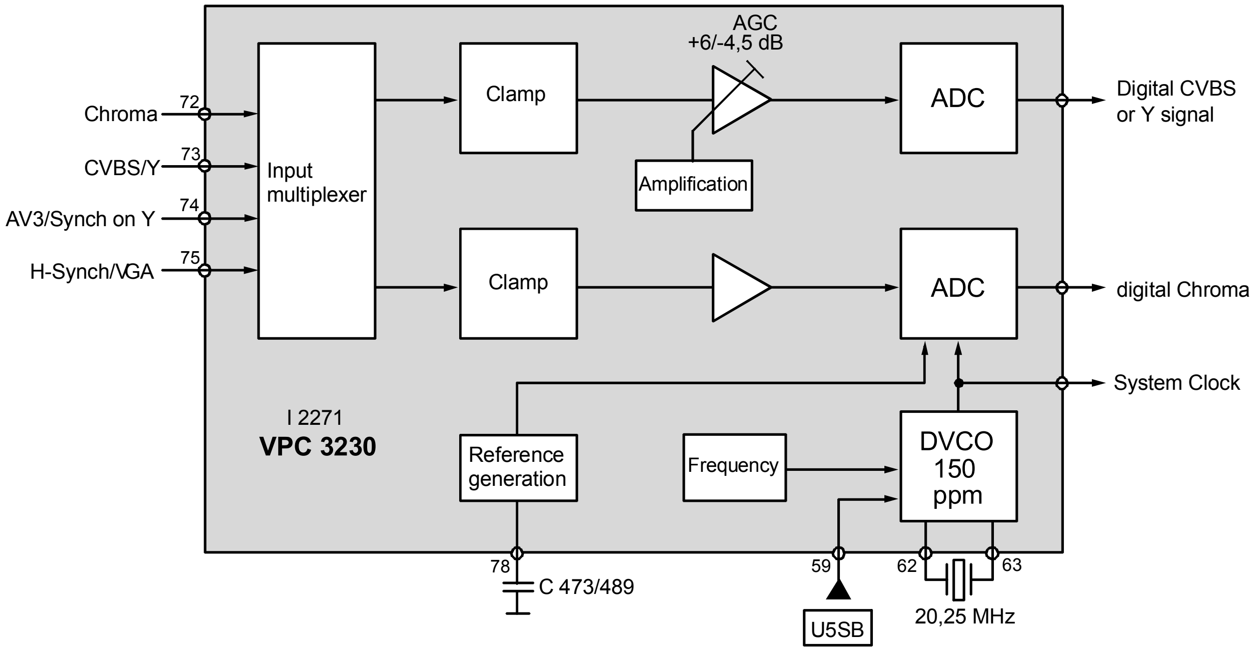
- Input interface with signal selection and two precision 8 bit A/D converters
- 20.25 MHz clock generator
- high quality, adaptive 4 line comb filter
- Multistandard colour decoder for PAL, NTSC and SECAM
- Letterbox detector
- Output format conversion (Output formatter)
- I²C bus interface
- Synchronisation block
- RGB/YUV interface

4.3.1 Input interface

On signal board Q 2500, the input multiplexer is switched in such a way that a choice can be made between two pairs of signals. If an FBAS signal, for example, is supplied by a receiver unit or a Y/C signal is fed to an interface, pin 73 for the FBAS/Y signal and pin 72 for the chroma signal are switched.

So that the signals from the ADC can be correctly digitised, two conditions must be fulfilled. The d.c. level and the amplitude of the signals must be adapted to the ADC . The d.c. level is defined by a signal clamp. For this there is a clamp circuit in the FBAS/Y path that clamps the signal to the rear black shoulder.

Block diagram, VPC 3230 input interface

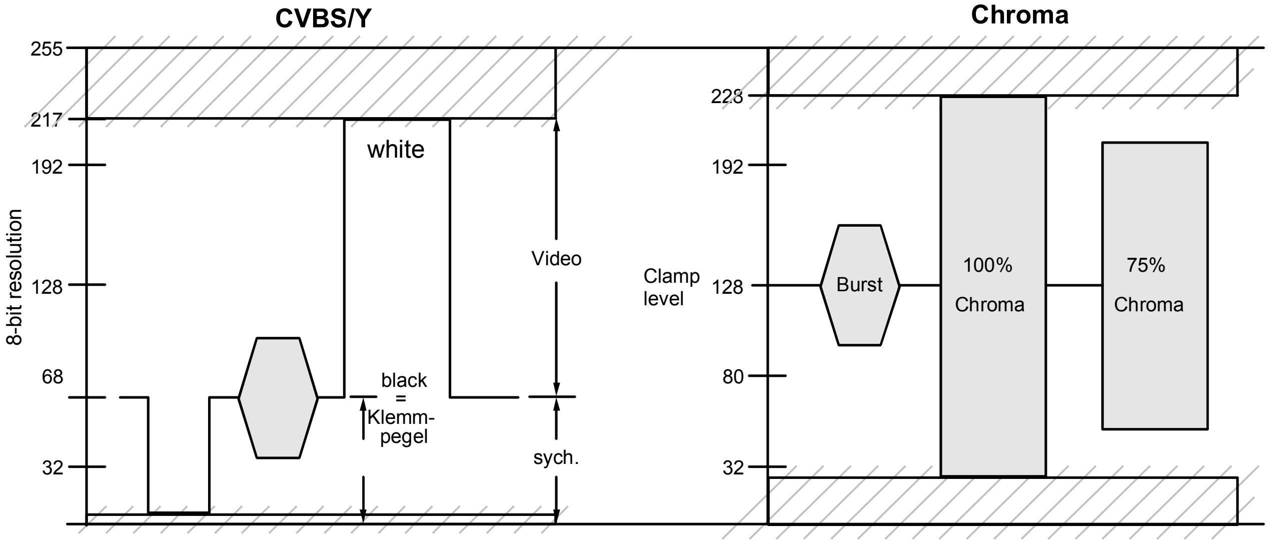

Chroma
72
CVBS/Y
73
AV3/Synch on Y
74
H-Synch/VGA
75
Input multiplexer
Clamp
Clamp
AGC
+6/-4,5 dB
Amplification
ADC
ADC
Digital CVBS or Y signal
digital Chroma
System Clock
I 2271
VPC 3230
Reference generation
Frequency
DVCO 150 ppm
78
C 473/489
59
U5SB
62
63
20,25 MHz

The chroma signal is clamped to its middle value. The following automatic amplifier control in the FBAS/Y path has a control range of -4.5 dB to +6 dB and ensures that even for different input levels the FBAS/Y signal is always optimally adapted to the ADC. In the chroma branch a fixed amplification is sufficient.

The FBAS/Y signal, as also the chroma signal for Y/C operation are digitised at a cycle rate of 20.25 MHz. The resolution of the two ADCs is 8-bit. Therefore, at the output of the input interface there is an 8-bit wide FBAS or Y data stream and for Y/C operation also an 8 bit wide chroma data stream. Both ADCs need a corresponding reference value. This is produced internally in the reference generation and stored externally on pin 78 by C 488/489.

4.3.2 20.25 MHz clock generator

The frequency determining 20.25 MHz Quarz X 2283 is connected to pin 62/63 of VPC 3230. The clock generator is controlled from the synchronisation block. In normal operation the clock generator is line frequency coupled. In the VCR mode, the line frequency coupling is switched off.



A/D changer area for CVBS/Y and Chroma signal

4.3.3 Comb filter

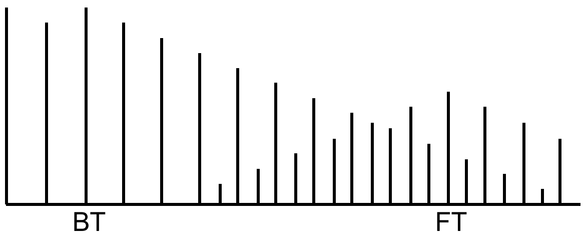
In this area of VPC the normally unavoidable Cross Colour and Cross Luminance interferences in the PAL system are eliminated.

In addition, the use of a comb filter even for colour transmissions permits the full 5 MHz Y resolution to be achieved. Without a comb filter it would be limited to approx. 3.8 MHz by the chroma trap, which would otherwise be required.

This function can be switched off, as it is the case that for all receiver-side circuits for picture improvement, even using a comb filter, there are some rare picture presentations which are not good. Switching off is implemented automatically via the analysis circuit. As this has error-free functioning, the user does not need to worry about switching off.

- **Function of a comb filter**

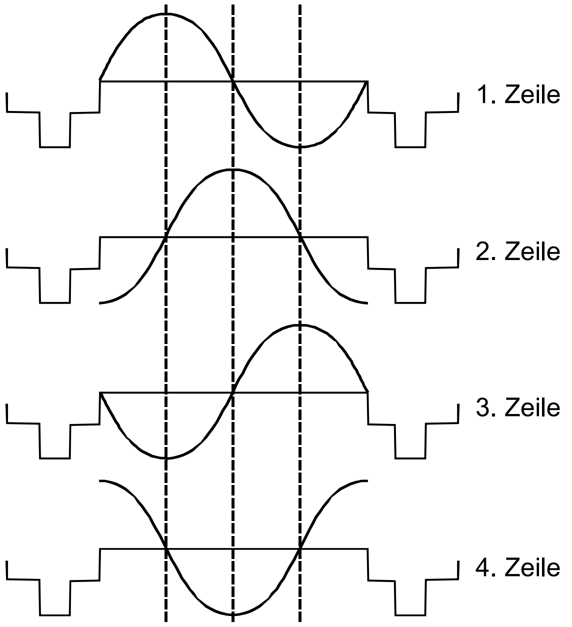
Let us consider the transfer method of the PAL signal. The brightness information determines that the full video bandwidth is not occupied for all frequencies, but only in specific areas. The colour information is inserted into these energy gaps.



If the colour carrier is in one of these energy gaps, then all sideband frequencies are in the gap as well. For this the picture and colour carrier frequencies must be firmly coupled. The product of these two frequencies is an overlapping frequency. The sine waves cause light and dark pixels on the screen, which have a fixed position from line to line, so that on the screen these form a vertically placed light-dark pattern. The higher the colour carrier frequency the less pronounced the Moiré becomes.

In order to keep interference with the picture as low as possible, the phase position of the colour carrier frequency from line to line is shifted forward by 90°. In this way, bright and dark pixels only overlap after four lines. At normal distances the eye cannot detect this interference.

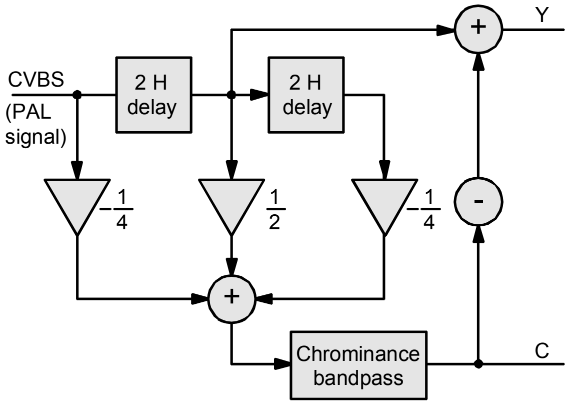
This compensation is known as "Fourth Line Offset Procedure".

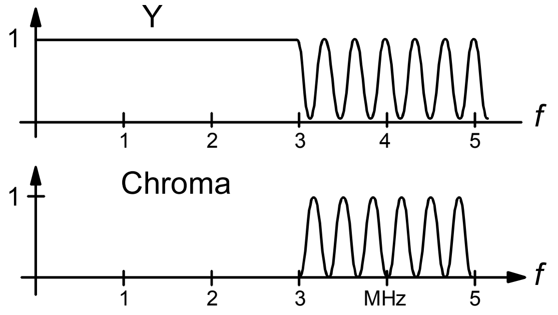


This fourth line offset now permits the filtering out of colour components from brightness information, and the reverse. The phase shift from line to line causes a counter phasing of the colour carrier every two lines.

If a two-line delay line is inserted into the circuit and the direct and delayed signals are added together, the colour information is removed and the brightness information is present on the output at double the amplitude.

If one subtracts the two signals from one another, the brightness information is eliminated and the colour information is present at double the amplitude on the output of the circuit.





Theoretically this circuit supplies error free results. A condition for this, however, is the phase and amplitude equality of the chroma signal over 3 lines, which is only the case for the same and equally saturated colours. In practical terms picture joining can occur, in which cross colour and cross luminance interference cannot be removed by the comb filter. Therefore, another circuit is integrated, in which three lines in sequence, from the point of view of both phase and amplitude, are compared.

If a deviation is detected that goes beyond a specific difference, the comb filter function is automatically switched off and the separation of the two components is implemented traditionally with chroma trap and band pass.

As VPC 3230 requires four lines to determine whether the comb filter is to be switched off, the filter operates more efficiently and more frequently than for a two line comb filter.

4.3.4 Multi-standard colour decoder

This block executes demodulation for all TV standards - PAL, NTSC and SECAM. Additional external components are no longer required. On the output of the colour decoder there is an 8 bit wide luminance and chrominance signal respectively in 4:2:2 format.

The VPC monitors the Auto S-VHS detection by means of the colour decoder for the separate chroma line of the colour burst. If signals are fed in from a VHS video recorder, then no burst is present on a separate chroma line. This is in turn communicated to the CCU. The CCU switches to VHS operation. If an S-VHS recorder is connected then a colour burst is measured on the chroma line on playback and the CCU switches the VPC to S-VHS operation via the I²C bus.

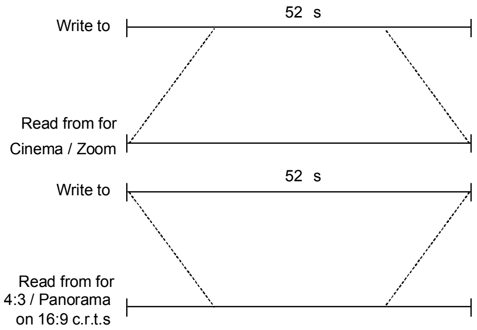
4.3.5 Line compression and decompression

To reproduce 4:3 pictures on a 16:9 c.r.t., and also for the various zoom modes, the video signal must be lengthened, or stretched, horizontally. For this the VPC 3230 has a line memory. Selection occurs at a slower speed, with the line beginning and end not being read (zoom, cinema)

However, quicker selection is also possible. For this the start is delayed with respect to the deflection and the selection is ended before the line end of the deflection (4:3 and Panorama for the 16:9 c.r.t).

The vertical correction of the signal is achieved by the line interpolation in SAA 4991.

Line compression/decompression

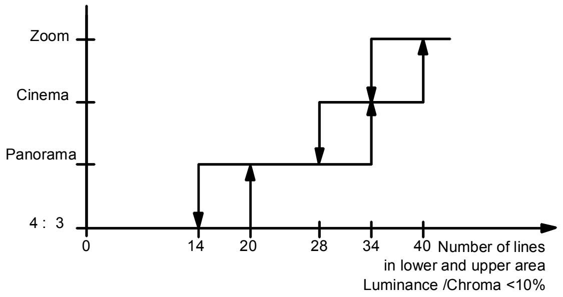


Letterbox detector

For Cinemascope or other film standards upper and lower black bars of various thickness are visible. These black bands can be removed by various zoom functions or at least reduced. Devices with 16:9 c.r.t.'s are also fitted with an automatic format conversion. Depending on the thickness of the black bars this automatic movie detection - AMD – switches between three different zoom modes. For this the Letterbox detector measures the luminance and chrominance components in the upper and lower area.

If, within defined lines, luminance and chrominance values of less than 10% are measured, the CCU switches the deflection controller and the display processor to the appropriate geometrical format. As programme logos are often placed on the right and left of the black bars, no measurement takes place in this area.

Automatic format conversion for 16:9 devices.



As 4:3 picture presentation with upper and lower black areas can lead to false results, the analysis occurs 4 sec. before switching occurs. If, however, undesired conversion processes occur, the function can be switched off with the remote control.

4.3.6 Output format conversion

Up to now luminance and chroma signals have been processed IC internally at a cycle rate of 20.25 MHz. For additional processing by the 100 Hz Philips IC set, an output cycle rate of 13.5 MHz is required. In the Output Formatter, therefore, the output data is converted from 20.25 MHz to 13.5 MHz. The YUV output format is also converted at this stage to 4:2:2 and output by a multiplex procedure to 8 lines. The multiplex cycle rate must therefore have the double cycle rate of 13.5 MHz. The multiple cycle rate on pin 27 of I 2271/ therefore has a frequency of 27 MHz.

4.3.7 Synchronisation block

The synchronisation block generates all the synchronous, sampling, cycle and clamp signals that are necessary for internal and external signal processing.

Before the digital video signal reaches the horizontal and vertical synchronous separation stage, it passes through a 1 MHz low-pass. With the low-pass, video and noise components >1 MHz are suppressed. All signals that are required for the various processing steps in the VPC are controlled via an internal PLL stage and counter.

No special synchronous signals are used for other external signal processing. The SAA4979 detects picture and line start from the data delivered by the VPC, and for further signal processing produces independent V/H synchronous signals. The VPC 3230 supplies the 27 MHz multiplex cycle to pin 27 for the digital luminance/chroma signals.

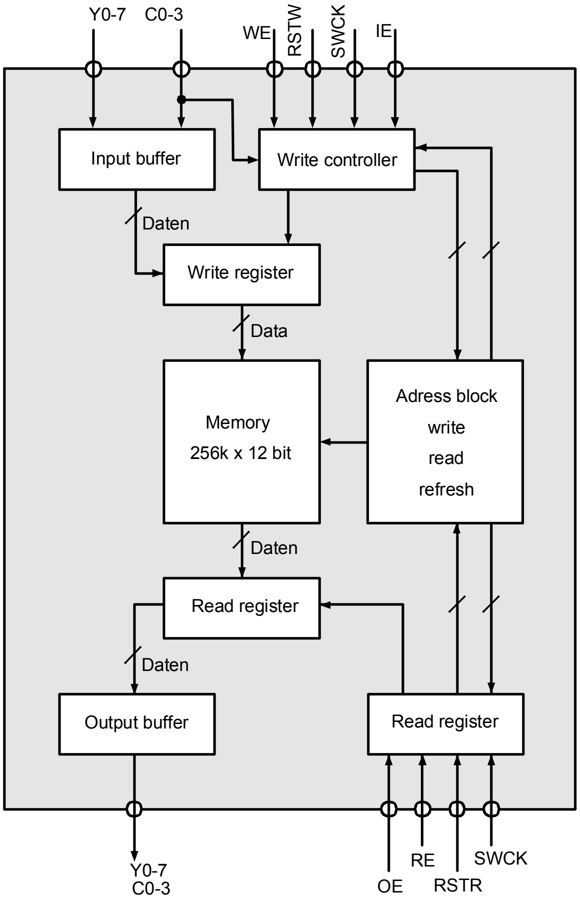
4.3.8 I²C bus interface

Communication between C 161 and VPCm is via the I²C bus interface. The register in the VPC is loaded via this interface after start up and the status in operation is selected via it.

4.4 Half picture memory SAA4955HL

The two memory IC's and the memory integrated into the SAA 4979 are functionally identical, their tasks , however, are different.

SAA4955HL block diagram


Y0-7
C0-3
WE
RSTW
SWCK
IE
Input buffer
Write controller
Daten
Write register
Data
Memory
256k x 12 bit
Adress block
write
read
refresh
Daten
Read register
Daten
Output buffer
Read register
Y0-7
C0-3
RE
SWCK
OE
RSTR

The picture memory in SAA 4979 is for the actual 100 Hz function in the circuit, whereas picture memories 2 and 3 I 2451/ I 2461 facilitate noise suppression, the suppression of line quivering, interpolation and a full line freeze frame by a delay of 1 half picture.

Data writing and reading for the two memories take place completely independently of each other.

Inputting and outputting for a single memory is also separately controlled. Data is therefore written to one area of the memory, whilst it is read from another area.

4.4.1 Storage space

The IC is organised into in 256 k words each of 12 bit. Two independent clock signals for writing and reading allow these functions to be carried out concurrently and independently.

A total of 3 072 000 bits can be stored, which corresponds to a little more than one half picture.

This comprises the following:

Sampling rate 16 MHz at a line frequency of 15.625 kHz

$$\frac{16\ \text{MHz}}{15.625\ \text{kHz}} = 1024 \text{ sampling values per line}$$

As the synchronous pulse and the front and rear black shoulder are not required, there are 832 sampling values per line for the actual picture signal. A sample value corresponds to one displayed pixel on the screen.

The sampling gap is not required in the vertical direction either. There are therefore 290 lines per half picture.

832 pixels x 290 lines = 241 280 pixels

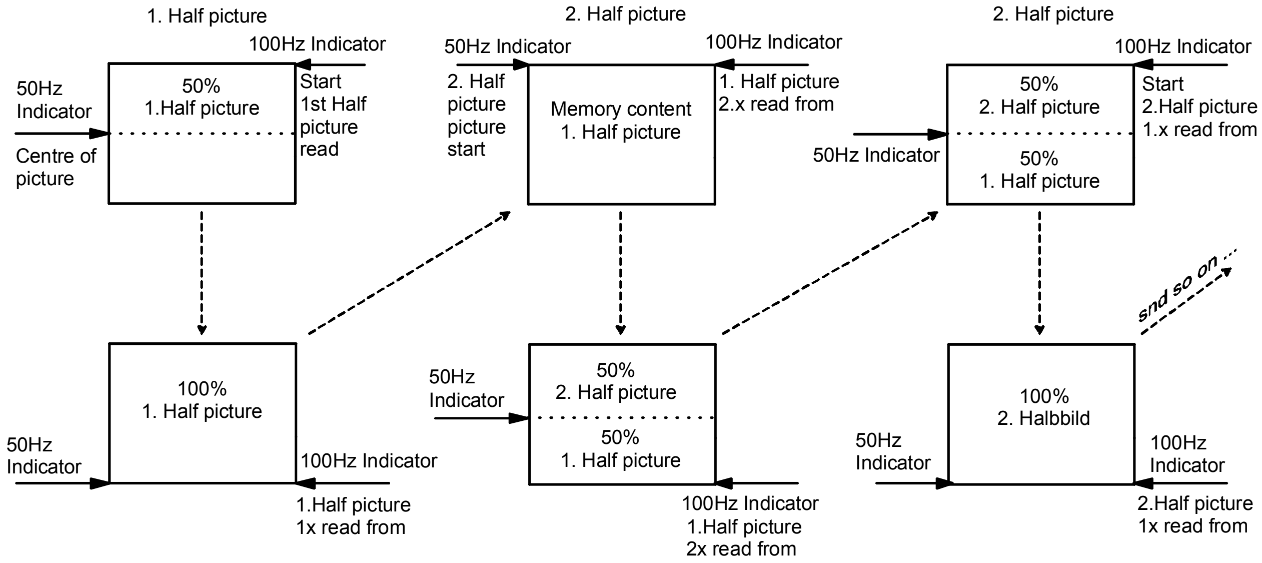
Therefore for each half picture 241 280 pixels must be stored. At a resolution of 8 bit Y and 4 bit chroma

241,280 pixels x 12 bit = 2,895,360 bit

are required for half picture storage capacity.

The 3 Mbit is sufficient for the separate, continual inputting and outputting of this function.

50/100Hz write/read cycle


1. Half picture
100Hz Indicator
50Hz Indicator
Centre of picture
50%
1.Half picture
Start
1st Half picture read
2. Half picture
50Hz Indicator
100Hz Indicator
2. Half picture picture start
Memory content
1. Half picture
1. Half picture
2.x read from
2. Half picture
100Hz Indicator
50Hz Indicator
50%
2. Half picture
50%
1. Half picture
Start
2.Half picture
1.x read from
and so on ...
50Hz Indicator
100%
1. Half picture
100Hz Indicator
1.Half picture
1x read from
50Hz Indicator
50%
2. Half picture
50%
1. Half picture
100Hz Indicator
1.Half picture
2x read from
50Hz Indicator
100%
2. Halbbild
100Hz Indicator
2.Half picture
1x read from

4.4.2 Conversion of signals in 100 Hz in memory 1

Frequency doubling takes place in the half picture memory 1 (in I 2311), as it is read at double speed. This means it is possible to read the memory twice, whilst it is only written to once. The first reading of a half picture always starts when a little over half the picture is in memory. Due to the double speed, writing to and reading out end at about the same time. As the return times at 100 Hz are also twice as fast, reading out starts before writing to. The picture is therefore read out for the second time and during this time up to half of the next half picture is written to memory.

4.4.3 Half picture memory 2 and 3

In this half picture writing to and reading out of memory take place at the same speed. The half picture is read to memory a second time and so delayed by a half picture. This means that half picture A can be written to and read from memory, whilst the same is happening in memory 1 for half picture B.

4.4.4 Control pulses

The memory is controlled by the following pulses:

pin 22: SWCK (Serial Write Clock)
Cycle for reading in the Y/C signals to the memory.

pin 23: RSTW (Reset Write)
The address counter for writing at the start of the memory area is set at H level.

pin 24: WE (Write Enable)
So long as H level is present, the address counter continues counting to write with WCK.

pin 25: IE (Input Enable)
Data inputs for Y/C signals are released at H level.

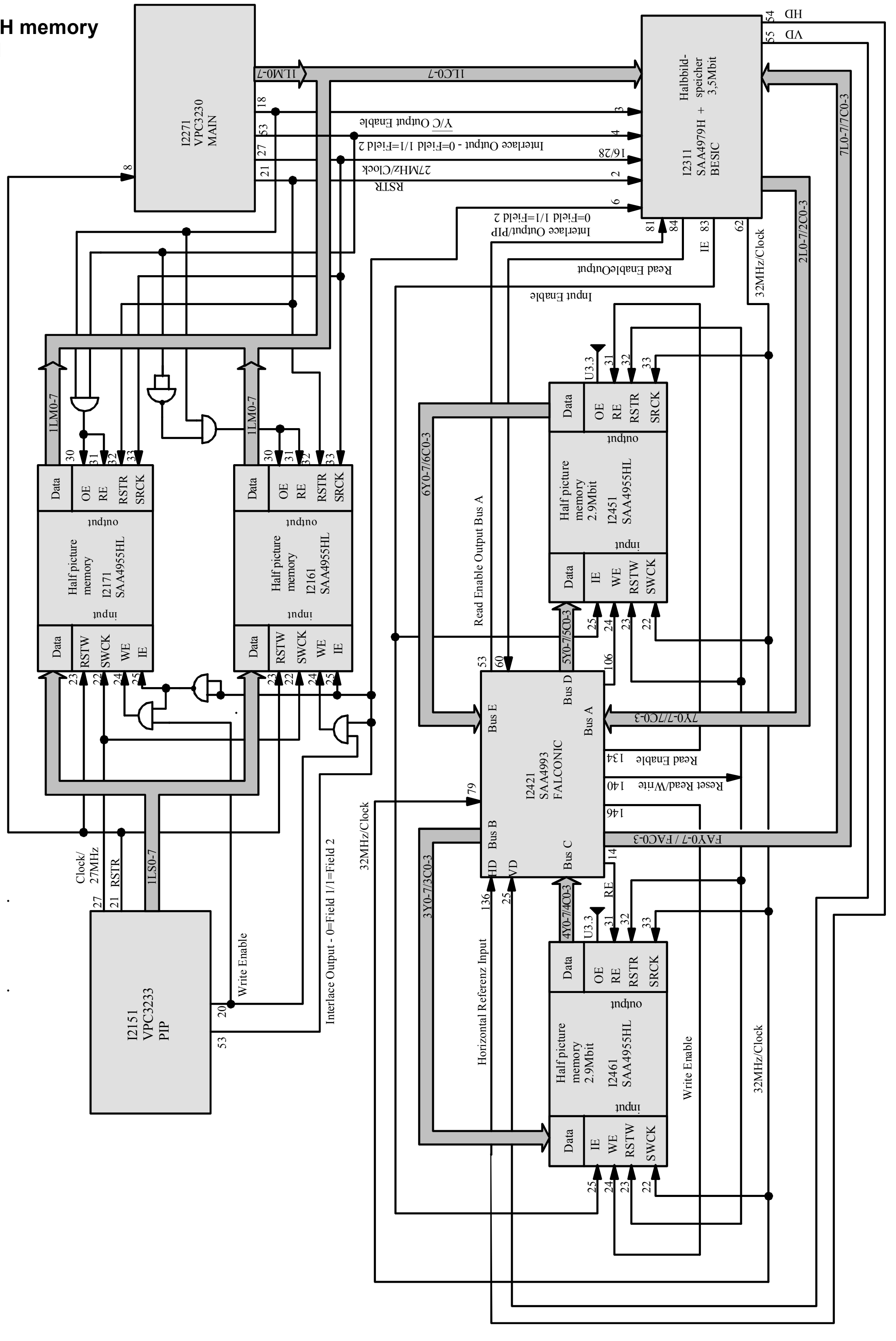
pin 30: OE (Output Enable)
Data outputs for Y/C signals are released at H level.

pin 21: RE (Read Enable)
So long as H level is present, the address counter continues counting to read with RCK.

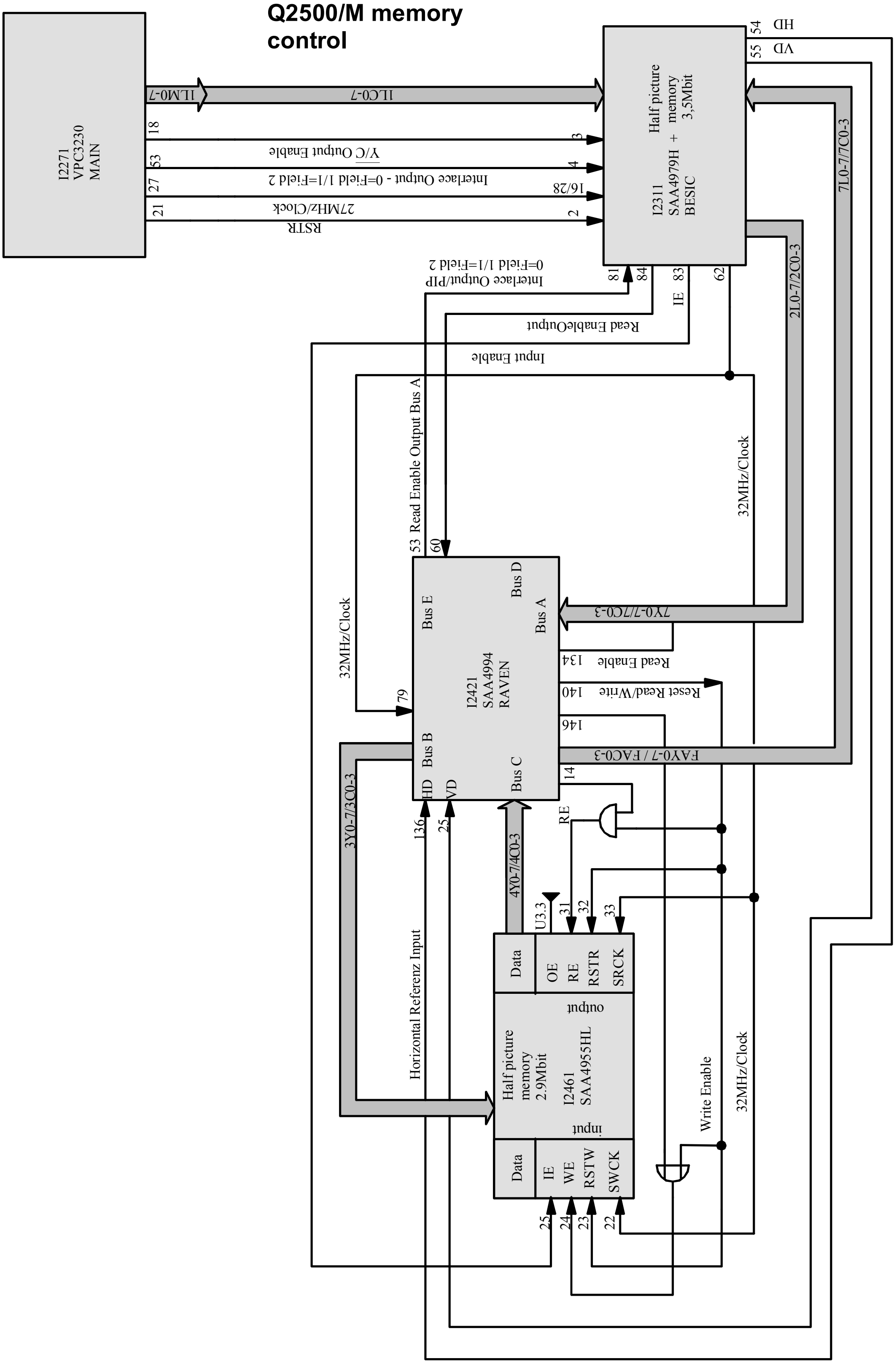
pin 32: RSTR (Reset Read)
H level sets the address counter to read at the start of the memory area.

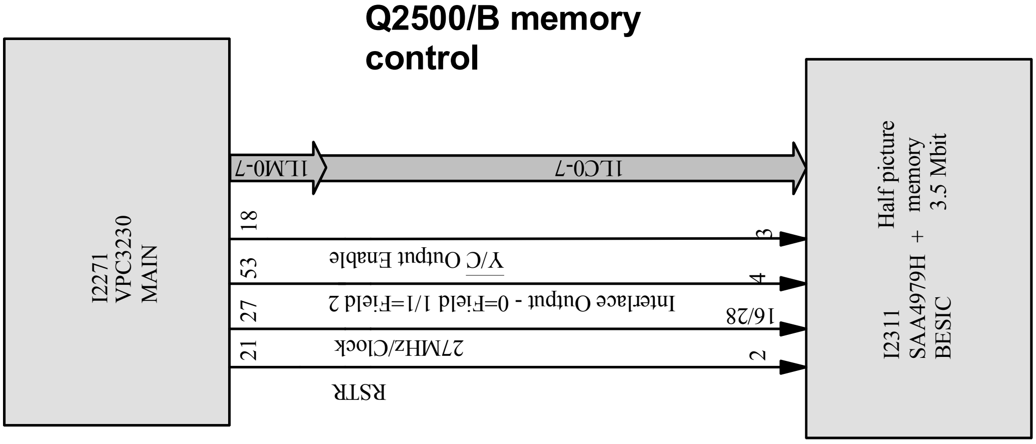
pin 33: RCK (Read Clock)
Cycle for reading the Y/C signals from the memory.

Q2500/H memory control


I2271
VPC3230
MAIN
I2311
SAA4979H + Halbbild-speicher 3,5Mbit
BESIC
1LM0-7
1LC0-7
Y/C Output Enable
Interlace Output - 0=Field 1/1=Field 2
27MHz/Clock
RSTR
Interlace Output/PIP 0=Field 1/1=Field 2
Read EnableOutput
Input Enable
HD
VD
7L0-7/7C0-3
2L0-7/2C0-3
32MHz/Clock
Half picture memory
I2171
SAA4955HL
Half picture memory
I2161
SAA4955HL
Half picture memory 2.9Mbit
I2451
SAA4955HL
Half picture memory 2.9Mbit
I2461
SAA4955HL
Data
OE
RE
RSTR
SRCK
output
input
RSTW
SWCK
WE
IE
U3.3
6Y0-7/6C0-3
Read Enable Output Bus A
5Y0-7/5C0-3
I2421
SAA4993
FALCONIC
Bus E
Bus D
Bus A
Bus B
Bus C
7Y0-7/7C0-3
Read Enable
Reset Read/Write
FAY0-7 / FAC0-3
3Y0-7/3C0-3
4Y0-7/4C0-3
Horizontal Referenz Input
Write Enable
32MHz/Clock
Clock/ 27MHz
RSTR
1LS0-7
I2151
VPC3233
PIP
Write Enable
Interlace Output - 0=Field 1/1=Field 2

Q2500/M memory control


I2271
VPC3230
MAIN
1LM0-7
1LC0-7
18
53
27
21
Y/C Output Enable
Interlace Output - 0=Field 1/1=Field 2
27MHz/Clock
RSTR
3
4
16/28
2
Half picture memory + 3,5Mbit
I2311
SAA4979H
BESIC
54 HD
55 VD
7L0-7/7C0-3
2L0-7/2C0-3
81
84
83
IE
62
Interlace Output/PIP 0=Field 1/1=Field 2
Read EnableOutput
Input Enable
32MHz/Clock
53 Read Enable Output Bus A
60
I2421
SAA4994
RAVEN
Bus E
Bus D
Bus A
Bus B
Bus C
HD
VD
79
7Y0-7/7C0-3
Read Enable 134
Reset Read/Write 140
146
FAY0-7 / FAC0-3
14
RE
136
25
3Y0-7/3C0-3
4Y0-7/4C0-3
U3,3
31
32
33
Data
OE
RE
RSTR
SRCK
output
Half picture memory 2.9Mbit
I2461
SAA4955HL
input
Data
IE
WE
RSTW
SWCK
25
24
23
22
Horizontal Referenz Input
Write Enable
32MHz/Clock



Q2500/B memory control

I2271
VPC3230
MAIN
ILM0-7
ILC0-7
18
53
27
21
Y/C Output Enable
Interlace Output - 0=Field 1/1=Field 2
27MHz/Clock
RSTR
3
4
16/28
2
I2311
SAA4979H + Half picture memory 3.5 Mbit
BESIC

4.5 Falconic module SAA 4993

With the conversion of a picture signal to a line coupled sampling and level adaptation at 3.3 V, 100 Hz is achievable with a 3 Mbit picture memory and a memory controller

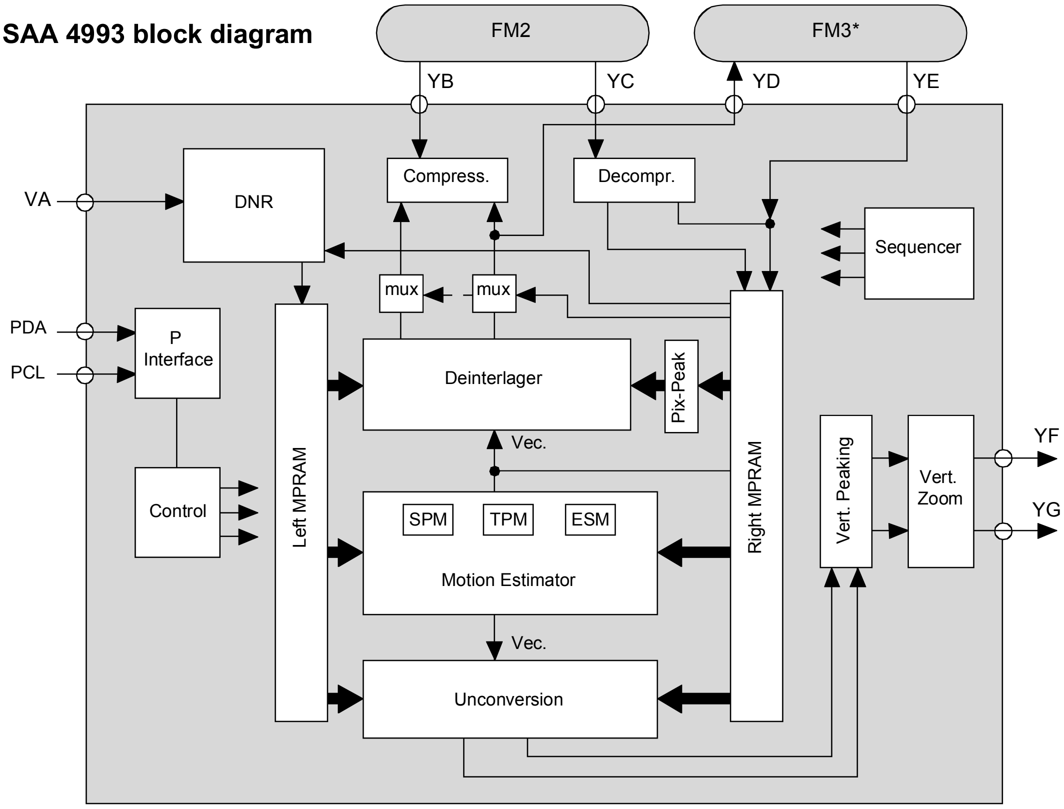
As doubling of the picture change frequency, depending on picture quality and picture presentation, can lead to undesired side effects, a number other features are provided on the Q 2500 chassis. This means that the side effects can be compensated for.

4.5.1 Noise reduction

Together with a second picture memory, SAA 4993 is able to eliminate some of the picture noise that occurs owing to an inadequate antenna signal.

Internally the IC has two separate signal paths, one for the Y and one for the chroma signals. Functionally they are both identical. In the chroma path is a demultiplexer on the input and a multiplexer before the output.

SAA 4993 block diagram

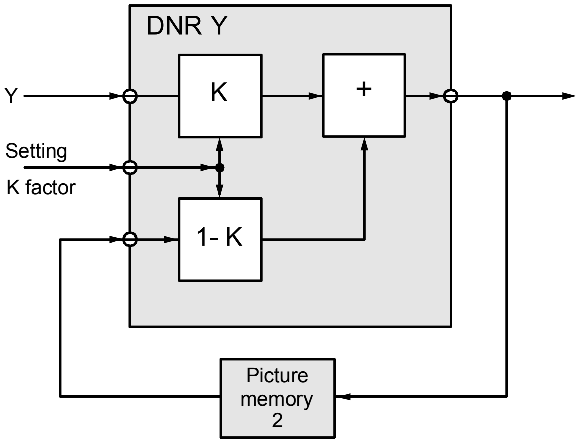

FM2
FM3*
YB
YC
YD
YE
VA
DNR
Compress.
Decompr.
Sequencer
mux
mux
PDA
PCL
P Interface
Left MPRAM
Deinterlager
Pix-Peak
Right MPRAM
Vec.
Control
SPM
TPM
ESM
Motion Estimator
Vert. Peaking
Vert. Zoom
YF
YG
Vec.
Unconversion

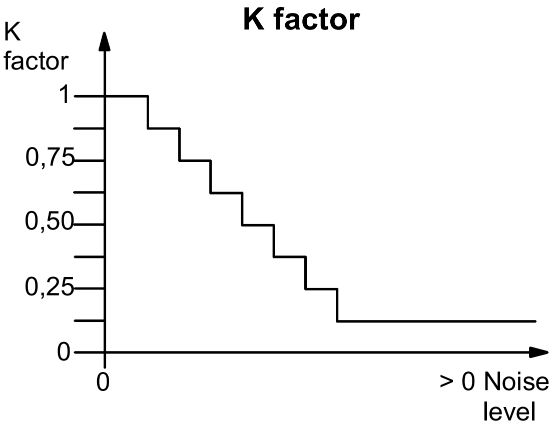
* (SAA 4994 does not control FM3)

Simply expressed the noise suppression system consists of the current half picture signal, in which components of the previous signal are mixed. The composition of the output signal, that is the number of components of the direct and the number of components of the delayed half picture, are determined by the so-called K factor. This K factor is determined by integrated automation.

When using the automation the K factor is dependent on the movement between the half pictures. If there is a lot of movement, noise suppression is not very effective.

Principle noise suppression


DNR Y
Y
K
+
Setting
K factor
1- K
Picture memory 2



Information about the size of movement is provided by the movement detection. This occurs only in the Y branch, with which the K factor is set simultaneously for chroma and Y.

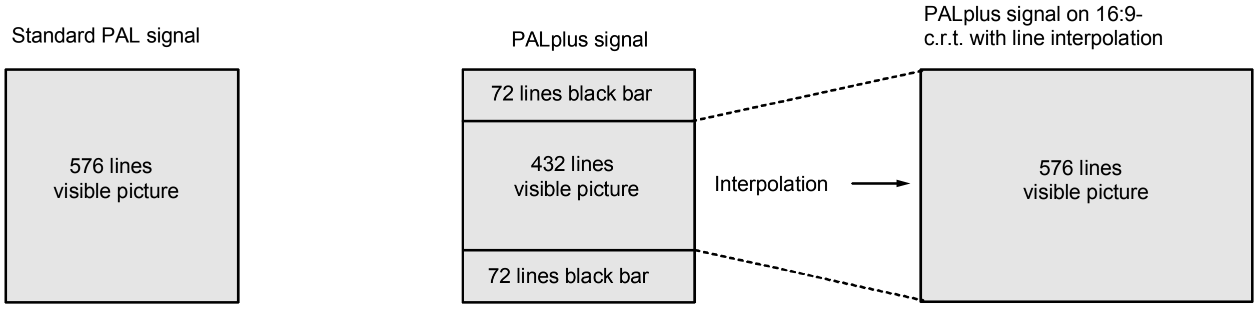
The drawing shows the DNR principle for the Y path. As already mentioned the circuit in the chroma path is identical. The K factor can have a value from 0 to 1. At K = 1, 100% of the direct signal and 0% of the delayed signal is switched to the following "And". No noise suppression is therefore available.

In the other extreme case K = 0, only the delayed signal would be switched, which would correspond to a freeze frame. To avoid this the K factor in our TV sets can never be 0.

Otherwise it would only be programmes with a weak signal that would be incapable of being displayed.

4.5.2 Line interpolation

The line interpolations circuits allow a situation to be achieved in which a full-line picture is written for PALplus signals . The advantage with respect to a PALplus decoder is that even without a PALplus signal, the interpolation in all zoom modes delivers a full-line picture. This function is explained in the following paragraphs for PALplus, in the zoom functions the circuit operates similarly only with other factors.


Standard PAL signal
576 lines visible picture
PALplus signal
72 lines black bar
432 lines visible picture
72 lines black bar
Interpolation
PALplus signal on 16:9-c.r.t. with line interpolation
576 lines visible picture

A standard PAL signal consists of 576 visible lines. For PALplus, 144 of the lines are dark sampled and only 432 lines are transferred as a visible picture. In 16:9 c.r.t's these signals are shown in the ZOOM mode. In order to display 576 lines the information for 4 lines must be determined by 3 lines respectively. This computer operation is very complicated and will therefore not be explained here.

Line interpolation must be carried out both in chroma as in the Y branch.

4.5.3 Movement detector

In the Y branch there is a movement detector. Here current and previous half pictures are compared with each other. An assessment is made of whether it is a question of full pictures in Cinema Scope format. The CCU receives this information via the microprocessor for the Automatic Movie Detection (AMD). The movement detector is also responsible for the setting of the noise suppression K factor.

In addition, using the movement from the previous to the current half picture an assessment is made of how the movement between the two half pictures could behave. In this way, in the movement compensation stage immediately following a new half picture can be calculated. At the same time it must be taken into account that the two half pictures, contain the intermediate lines for the other half picture respectively. In this way a continuous process of movement over all half pictures is achieved, both for horizontal as well as vertical movements. The DMI (Digital Moving Interpolation) function is active for both full picture presentation and for standard video signals.

The operation of this switch is largely error free. Nevertheless, under unfavourable conditions negative effects can occur, therefore the DMI function can be switched off. Instead, the DLC (Digital Lineflicker Control) function is switched on.

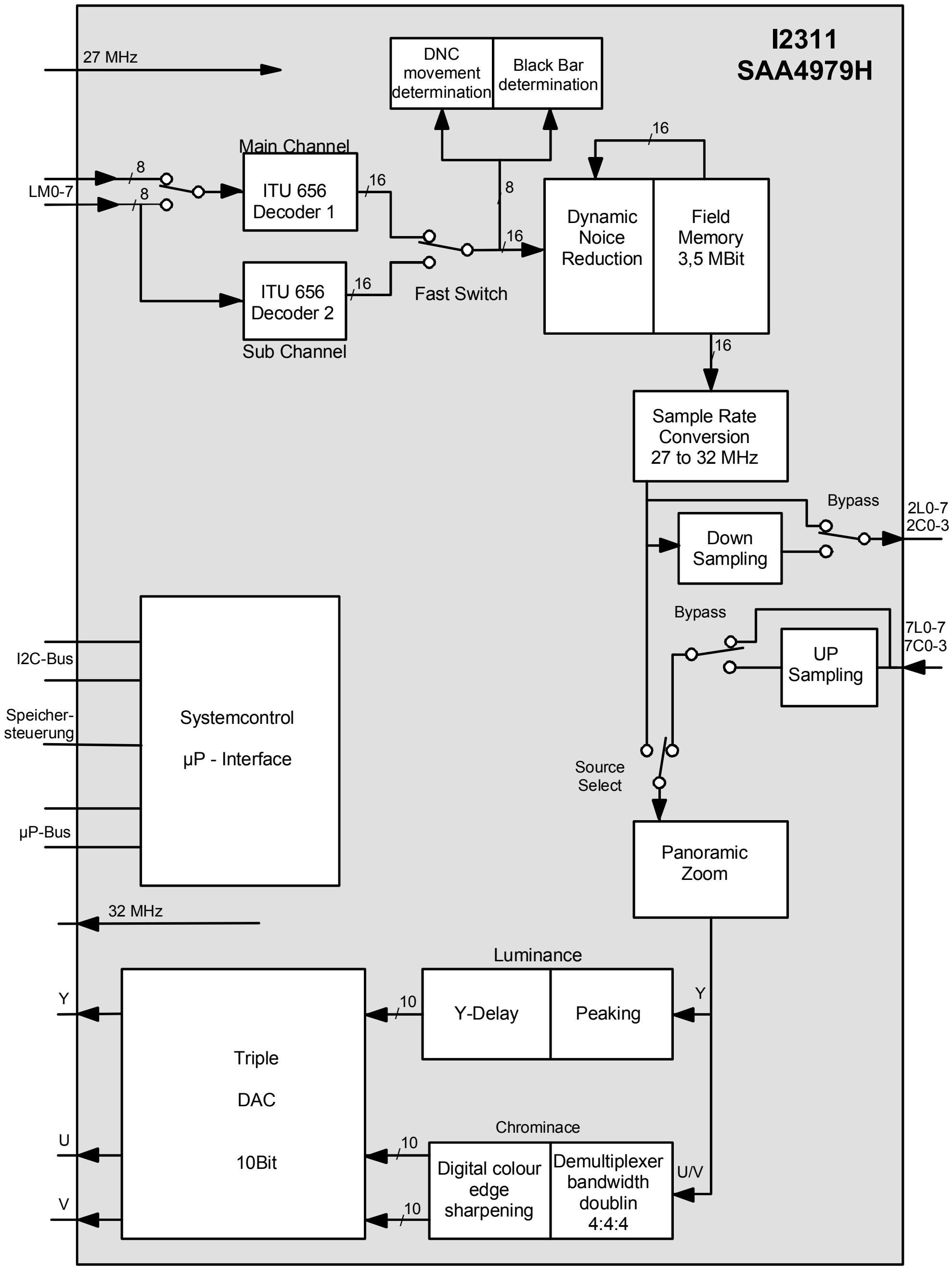
4.5.4 Memory control

Control of the SAA 4993 is implemented via the µP interface from I 2311. The µP bus is assigned to pins 26 (DA) and 27 (CI). In addition it is here in conjunction with the Memory Controller that writing to the 2nd picture memory and reading from the two memories is determined.

4.6 SAA 4979 (BESIC)

The next IC in the signal path, the SAA 4974, is designed for the following functions.

- Demultiplexer for luminance/chroma separation
- 3.5Mbit memory for 50/100Hz conversion
- Cycle rate converter from 27MHz to 32MHZ
- Two signal paths for the separate processing of the Y and chroma signals
- Demultiplexer for the chroma signals
- Band width doubling and digital CTI circuit for improved colour transfer
- Peaking circuit Y branch to increase picture sharpness
- Three blank stages for dark sampling
- Three 10 bit DACs for the generation of analogue R-Y-, B-Y- and Y-signals, I²C bus interface and timing control for the control of the individual processes through the microprocessor.
- Microprocessor bus for the control of the SAA 4993.
- Control of write and read processes in the half picture memory, as well as the total digital 100 Hz video signal processing.
- Generation of a 32 MHz cycle.
- Generation of H and V synchronous pulses for the TDA9332 video/deflection processor.

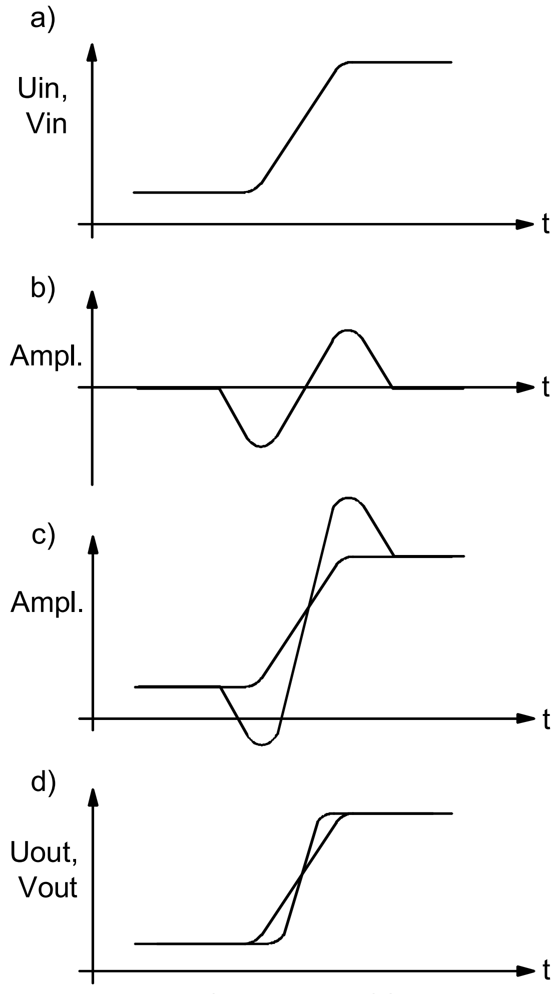

I2311
SAA4979H
27 MHz
DNC movement determination
Black Bar determination
Main Channel
LM0-7
8
8
ITU 656 Decoder 1
16
8
16
Dynamic Noice Reduction
Field Memory 3,5 MBit
16
ITU 656 Decoder 2
16
Fast Switch
Sub Channel
16
Sample Rate Conversion 27 to 32 MHz
Bypass
2L0-7
2C0-3
Down Sampling
Bypass
7L0-7
7C0-3
UP Sampling
I2C-Bus
Speicher-steuerung
Systemcontrol
µP - Interface
µP-Bus
Source Select
Panoramic Zoom
32 MHz
Luminance
Y
Y
Triple
DAC
10Bit
10
Y-Delay
Peaking
Chrominace
U
10
Digital colour edge sharpening
Demultiplexer bandwidth doublin 4:4:4
U/V
V
10

4.6.1 Chroma branch

In the design of the colour television transmission the compatibility with normal black/white systems must be observed, in order for colour transmissions to be received by black and white sets. For this reason the colour information must be integrated into the available frequency spectrum used for the brightness information.

Secondly, to prevent interference the bandwidth for the colour signal must be kept as narrow as possible. For this reason a bandwidth of only 1.2 MHz was selected and the carrier frequency set at 4.43 MHz.

Owing to the narrow bandwidth the rise times for colour change are very long, which appears on the screen as "washed out" transitions.



a) U, V input of SAA
b) U, V Correction signal
c) U, V input + Correction signal
d) sharpend and limited U, V

To compensate for this deficiency, two circuit components are incorporated into the SAA 4979, with which short rise times can be achieved artificially, thereby improving the colour transitions.

In the circuit before these components is a demultiplexer, with which 8-bit wide parallel R-Y- and B-Y signals respectively are derived from the supplied signals.

4.6.2 Band width doubling

In order to increase the effectiveness of the colour flank increase on the supply side, a doubling of the bandwidth from 4:1:1 to 4:2:2 is implemented.
Using a linear phase interpolation filter additional sampling values are calculated from the available chroma sampling values.

These calculated sampling values are inserted respectively between two available values, by which means the bandwidth is doubled. In this way, steep flanks can be transmitted more easily.

4.6.3 Colour flank sharpening

An improvement of the colour transition is achieved by a dual differentiation of the original chroma signal and the ensuing subtraction of the derived correction signal of the chroma signal.

The changes in these signals are evaluated in separate circuits for U and V, and if a threshold value specified by the software is exceeded a correction value is calculated. After the two derived correction signals have been cleaned of noise components, they are subtracted from the available chroma signals U and V. The subtraction is implemented by inversion of the correction signals and subsequent addition with the original signal.

To avoid colour phase errors by the overshooter, it must be blocked by limiter stages.

Here analogue signals are produced from the respective 8-bit wide digital R-Y and B-Y signals, which are then output at 1.8 Vss on pins 46 and 48.

4.6.4 Y signal path

The peaking circuit is not used. The signal is led directly to the sampling stage. This operates in the same way as the sampling stage in the chroma branch.

Via the sampling circuit, the digital Y signal, which is now 9-bits wide, reaches a DAC, which generates an analogue signal. This is then output on pin 44 at 1.5 Vss.

4.6.5 Microprocessor interface

All processes in the SAA 4979 are controlled by SDA6000 via the I²C bus 0 (pin 1 = SDA, pin 2 = SCL). In addition, information for the SAA 4993 and the memory control is also transferred.
The SAA 4993 is controlled by the BESIC via the microprocessor bus to pins 108 (µP DA) and 107 (µP CL).

Switching outputs 4 are used for the switching of the VGA synchronisation. If a switch is made to the VGA programme location, then pin 4 is switched from I 2311 to L level. With this logic state the vertical synchronous pulse of the VGA interface W 1011 pin 4 is switched directly to the video/deflector controller I 2521 via the four Nand gates I 2361 A/B/C and D. The VGA synchronous pulse is, in addition, monitored by I 2271 on its pin 17. If no synchronisation or false synchronisation is detected, I 2311 resets its output on pin 4 and thereby switches over to internal V synchronisation.

4.6.6 Control of the 100 Hz processing (Display)

This stage synchronises the read out from the half pictures and the writing to memory in the second memory. As the signals in the SAA 4993 are written to and read out, it has direct control and is only synchronised by the BESIC.

Via pulse RE (pin 84) the Falconic module controls the reading from both half picture memories and the writing to the second memory.
With pulse IE (pin 83) SAA 4979 controls the data inputs in the second half picture memory. With L level a switch can be made to freeze frame, for example.

Furthermore, the display stage gives a horizontal pulse on pin 54 and a vertical synchronous pulse on pin 55 for the synchronisation of the deflection in TDA9332. At the same time, the vertical pulse VD acts as a reset for the Falconic and the half picture memories, for resetting the address counter on reading from the memory and for writing to the second memory.

4.7 Video/deflection processor TDA 9332/Range Video/RGB path

The last IC for picture signal processing, apart from the RGB output stages, is the TDA 9332. It also controls the deflection stage.
Inputs for analogue R-Y, B-Y and Y signals:

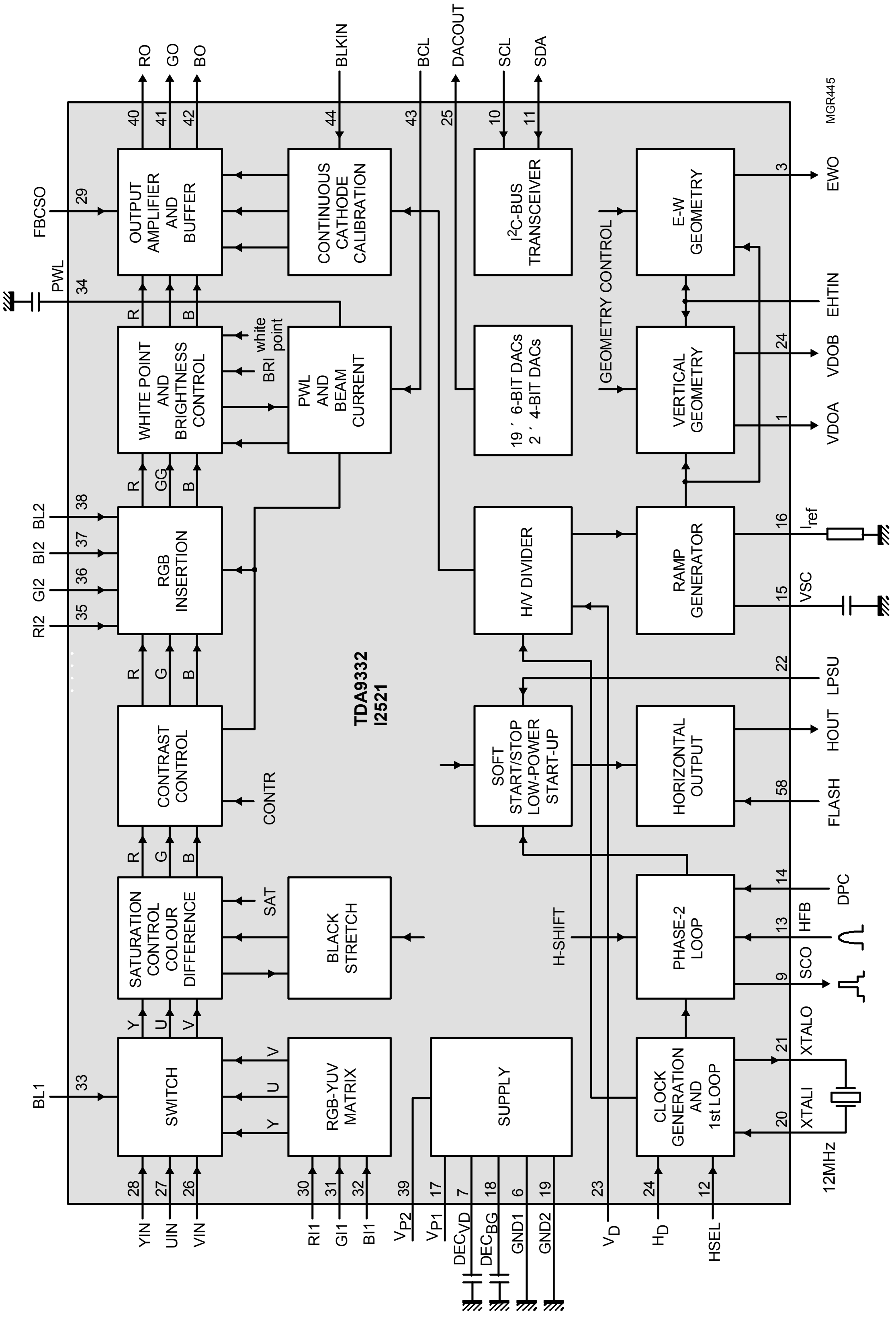
- Two RGB inputs for analogue signals from the CCU and the VGA interface and/or picture in picture generation
- Matrix circuits for RGB generation from the difference signals
- Signal selection for the switching of the required RGB signals
- Y and colour difference matrix for the generation of Y and difference signals from the selected RGB signal
- Hue control for NTSC operation and gamma correction in the Y branch
- Saturation, contrast and brightness setting

- RGB driver stages
- Beam current limiter circuit
- Automatic cut off control
- I²C bus interface and control register
- DAC for programmable d.c. voltage
- PLL for generation of cycle frequency
- Control block for the synchronisation of the output stages
- DAC for O/W, V control and H output stage
- Beam current dependent correction of the vertical and horizontal amplitude and beam current dependent H phase correction.
- Horizontal start up control
- I²C bus interface

4.7.1 Matrix circuits and signal selection

The R-Y, B-Y and the Y signals are fed to the IC via pins 26, 27 and 28. The green component is recovered and the RGB signals produced using two matrix circuits, one after the other.

These RGB signals are fed to a selection circuit, to which the RGB signals from the CCU via pins 2, 3 and 4 and from the VGA-interface via pins 35, 36 and 137 are also fed. With this circuit the required signal is selected or two signals mixed together.


TDA9332
I2521
MGR445
OUTPUT AMPLIFIER AND BUFFER
CONTINUOUS CATHODE CALIBRATION
I²C-BUS TRANSCEIVER
E-W GEOMETRY
WHITE POINT AND BRIGHTNESS CONTROL
PWL AND BEAM CURRENT
19 × 6-BIT DACs
2 × 4-BIT DACs
VERTICAL GEOMETRY
GEOMETRY CONTROL
RGB INSERTION
H/V DIVIDER
RAMP GENERATOR
CONTRAST CONTROL
SOFT START/STOP LOW-POWER START-UP
HORIZONTAL OUTPUT
SATURATION CONTROL COLOUR DIFFERENCE
BLACK STRETCH
PHASE-2 LOOP
H-SHIFT
SWITCH
RGB-YUV MATRIX
SUPPLY
CLOCK GENERATION AND 1st LOOP
BRI
white point
CONTR
SAT
RO 40
GO 41
BO 42
BLKIN 44
BCL 43
DACOUT 25
SCL 10
SDA 11
EWO 3
EHTIN
VDOB 24
VDOA 1
Iref 16
VSC 15
LPSU 22
HOUT
FLASH 58
DPC 14
HFB 13
SCO 9
XTALO 21
XTALI 20
12MHz
FBCSO 29
PWL 34
BL2 38
BI2 37
GI2 36
RI2 35
BL1 33
YIN 28
UIN 27
VIN 26
RI1 30
GI1 31
BI1 32
VP2 39
VP1 17
DECVD 7
DECBG 18
GND1 6
GND2 19
VD 23
HD 24
HSEL 12
R
G
B
Y
U
V

According to the operating mode selection is either with H level on blank on pins 38 and 33 or controlled from the computer via the I²C bus.

In the following section of the circuit Y and colour difference signals are generated from the RGB signals.

4.7.2 Control stages

In the Y path the first component is a circuit for gamma correction and in the colour difference branch the colour saturation setting stage.

After RGB has been generated again from the difference signals and the Y signal, the setting stages for contrast and brightness are reached.

The control stages for contrast and colour saturation in the other IC's are set to maximum and have no function. There is, in addition, in each channel, a setting stage for the white value, and the black value is set with the amplifier stages that follow.

The white value and the basic setting of the black value are determined in the two corresponding positions of the service mode. In further a operation the black value is determined by the cut off control.

The RGB signals are output at a maximum of 3.5 Vss via pins 40, 41 and 42.
The measured values for cut off and leakage current are fed to the IC on pin 44. With the evaluation circuits for leakage current and cut off, together with the computer, subsequent adjustment is carried out via the output amplifier, in order to keep the picture impression stable independently of aging.

Pin 43 is connected to the base of the diode split transformer. The circuit integrated into the IC thereby receives information about the beam current flowing into the c.r.t. If the maximum permissible value is exceeded there, the circuit reduces the contrast and the brightness with the corresponding control stages. (see basic board “Beam current limitation“).

4.7.3 I²C bus interface and raster correction

All control processes such as brightness, contrast, etc are controlled via pins 10 and 11 of the I²C bus interface. In addition, a DAC can also be controlled via the I²C bus. For this, TDA 9332 on pin 25 outputs an adjustable voltage. This is fed to the rotation panel on pin 3 of connector W 1021. At this point an additional coil on the tube turns the deflection raster, thus providing compensation of the earth’s magnetic field at the installation site of the device. The value of the raster correction can set in both service mode and in the menu for picture functions.

If the device is turned, the influence of the earth’s magnetic field changes. The planned rotatable rack takes this into account. The rack is controlled from the chassis, with the rotation angle being determined by the TV software. Raster correction can also be determined, in that on rotation the voltage on pin 26 of TDA 9332 is changed.

The influence of the rotation angle on the raster displacement is almost linear. On installation of the device, it is sufficient for correct functioning of the correction to input a value for raster correction into the EAROM for the centre and the two end stops.

4.8 Picture in picture

On the signal board an optional picture in picture circuit is possible. This circuit consists of the video processor

VPC 3233 /I 2151 and the PIP memory I 2161/71 The video processor PIP is the same IC type as the main video processor I 2271. With the VPC 3233 various PIP representations are possible. Our device controls support 3 PIP representations.

Split Screen

The screen is split into two halves. On the left side the half picture is displayed and on the right side the picture of the PIP electronics. Both pictures are the same size and quality. In the horizontal level, sections of a picture on the left and right are naturally cut off. The core area, however, is correctly displayed.

PIP small

The picture in picture, which is reduced to 1/9 of its normal size, can be positioned in any of the four corners.

PIP large

The same is true as for PIP small, only the size is 1/4 of the normal picture.

For 4:3 devices Split Screen is not possible.

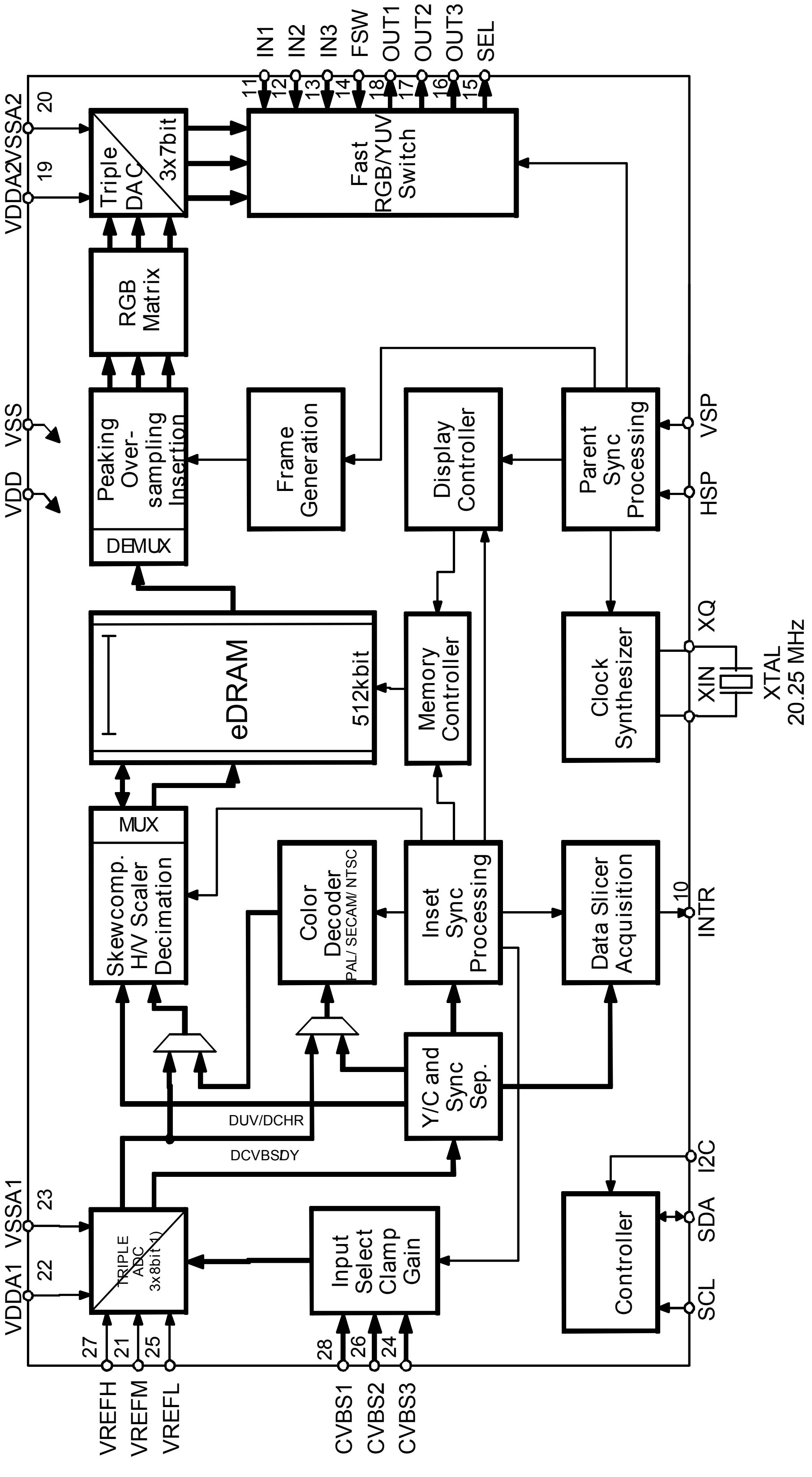
For small and large PIP display the PIP picture must be correspondingly compressed. This occurs at the vertical level by the interpolation of picture lines. For the small setting, 3 lines are compressed and for large setting 2 lines, and for each a new line is calculated by interpolation. In the horizontal level these lines are then compressed accordingly. The writing of the picture in picture data to the PIP memory is controlled completely by the PIP-VPC. Reading from memory is controlled fully from the main VPC.

Writing to and reading from memory is therefore independent. There is no synchronisation between the two VPC's.

The PIP processor processes FBAS as well as Y/C signals. The video transfer applies the FBAS/Y signal to pin 73 and the associated chroma signal to pin 72. All possible signal sources can therefore be displayed as PIP.

If an online module is integrated into the TV set, the picture can also be displayed by the online module as PIP. The Y/C signal from the online module reaches the pin connector W 1531 on the signal board. The TVO/Y signal is applied to pin 74, and the associated chroma signal to pin 71 of I 2151.

For the basic and medium signal board variants a single chip PIP processor SDA 9488 is used.


IN1
IN2
IN3
FSW
OUT1
OUT2
OUT3
SEL
11
12
13
14
18
17
16
15
VDDA2
VSSA2
19
20
Triple DAC
3x7bit
Fast RGB/YUV Switch
RGB Matrix
VDD
VSS
Peaking Over-sampling Insertion
DEMUX
Frame Generation
Display Controller
Parent Sync Processing
VSP
HSP
eDRAM
512kbit
Memory Controller
Clock Synthesizer
XQ
XIN
XTAL
20.25 MHz
MUX
Skewcomp. H/V Scaler Decimation
Color Decoder
PAL/ SECAM/ NTSC
Inset Sync Processing
Data Slicer Acquisition
10
INTR
Y/C and Sync Sep.
DUV/DCHR
DCVBSDY
I2C
VDDA1
VSSA1
22
23
TRIPLE ADC
3x8bit
Input Select Clamp Gain
Controller
SDA
SCL
27
21
25
28
26
24
VREFH
VREFM
VREFL
CVBS1
CVBS2
CVBS3

SDA 9488x / PiP-Prozessor
Q2500M/B

With this module the PIP function can be used with our devices. Split screen and Multi PIP are not used.
This processor does not form part of the digital signal processing. As you can see from the circuit diagram, the RGB signals from SDA 9488 pins 15/16 and 17 are fed directly to TDA 9332 (pins 30/31/32).
SDA 9488 receives the FBAS or Y/C signal to be processed on pins 26/28 from the video-conversion IC.
The necessary 100 Hz V/H synchronous signals are fed to pins 4 and 3.
For our medium devices as for our high variant a VGA interface can be retro-fitted. The VGA RGB signals are not, however, fed directly into the TDA 9332, as in the high-end device, but for VGA operation are looped through the SDA 9488 to the TDA 9332.
From the VGA interface the RGB signals are led to pins 11/12 and 13 of SDA 9488.

4.9 Video/deflection controller TDA9332 (deflection area)

The Philips TDA 9332 video/deflection controller can be used in standard TV's as well as in devices with double picture and line frequency.

The video/deflection controller is switched in the Q 2500 chassis in such a way that it can drive the H/V deflection with double the frequency.

4.9.1 Clock generation/Phase 2 loop

All the necessary cycle and synchronous signals necessary for internal signal processing are derived from this block.

The synchronous signals generated by SAA 4979 are fed to pin 24 (H synchronous signal) and to pin 23 (V synchronous signal) of the controller. The cycle frequency for the video/deflection processor is produced with an external 12 MHz quartz on pins 20 and 21. This cycle is synchronised by a PLL that operates with the horizontal synchronous pulse HA.

4.9.2 DAC for OW/V control and H output stage

The DACs for the two vertical -VD± control signals contain all vertical correction information. The VD± control signals are output to pins 1/2 and are fed via R 1032 and R 1033 to pins 2/3 of W 1511. In this way the V output stage on the basic board is controlled by d.c.

The vertical frequency E/W parabola also contains all correction information. The control signal is output by I 2521 on pin 3 and is fed via W 1511 pin 6 to the basic board. In this way the E/W output stage on the basic board is controlled.

The horizontal output is programmed in such a way that on pin 8 a rectangular signal with 13 µs H and 19 µs L level for control of the H-output stage on the basic board is output. The signal reaches Q 2556 and Q 2561 on pin 13 of pin connector W 1511 via two inverter stages and controls H output stage Q 534 on the basic board via H driver stage Q 526.

In the SAT standby, for SAT radio and for overwriting in standby, the c.r.t. must be switched off. For this the horizontal pulse is switched off via transistor Q 2951. The control of Q 2951 is implemented via pin 79 of the SDA 6000 microprocessor. The c.r.t. is switched off here with H level.

4.9.3 Beam current dependent correction the vertical/horizontal amplitude and the H phase

As we know the high voltage at the anode connection of the c.r.t diminishes at high beam currents, owing to the internal resistance of the high voltage generation. The lower high voltage means that the beam of electrons is not so strongly accelerated and can be deflected outwards again by the V/H magnetic deflection fields. The picture becomes larger.

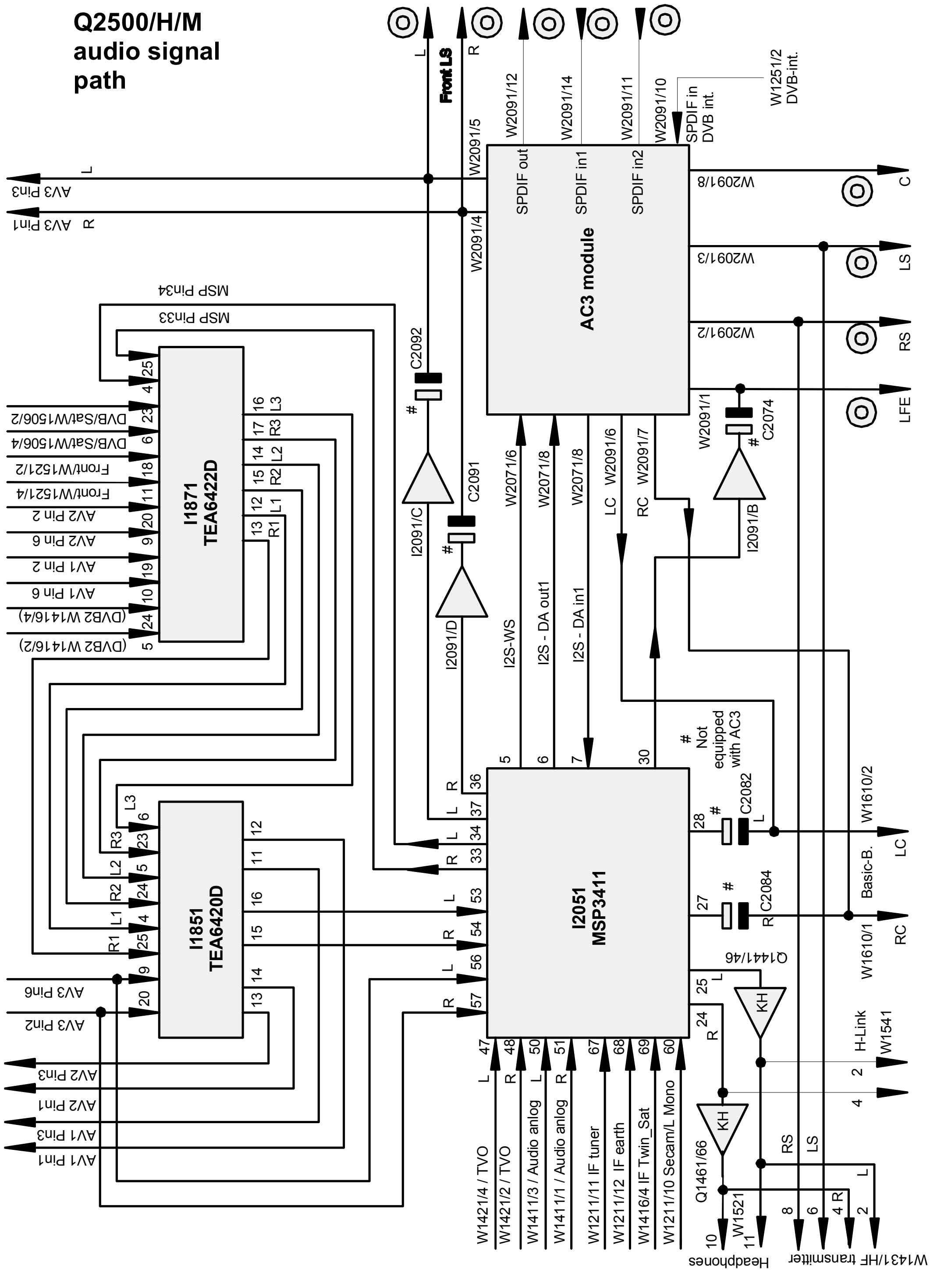
If the beam current decreases (darker picture content) the picture becomes smaller again. Appropriate corrective measures are necessary to prevent this video pumping or at least to reduce it. To do this beam current dependent correction information is applied to pins 4 and 14 of the deflection controller . The OW and V amplitude are influenced via pin 4 and the H phase via pin 14.

The beam current dependent information taken from the base of the diode split transformer and output by W 1511 via resistances and the two transistors Q 2639/Q 2638 is fed to pin 4 and pin 14 of TDA 9332. Switching via these two transistors ensures that the base voltage is adapted in an optimum way to I2521. pin 4/14 of I 2521 requires a voltage from 1.2 V to 2.8 V. The vertical amplitude compensation is defined firmly in I 2521 and is the same for all types of c.r.t. The horizontal amplitude compensation is influenced via internal registers by I 2521. Various values are held in EAROM for the various c.r.t types.

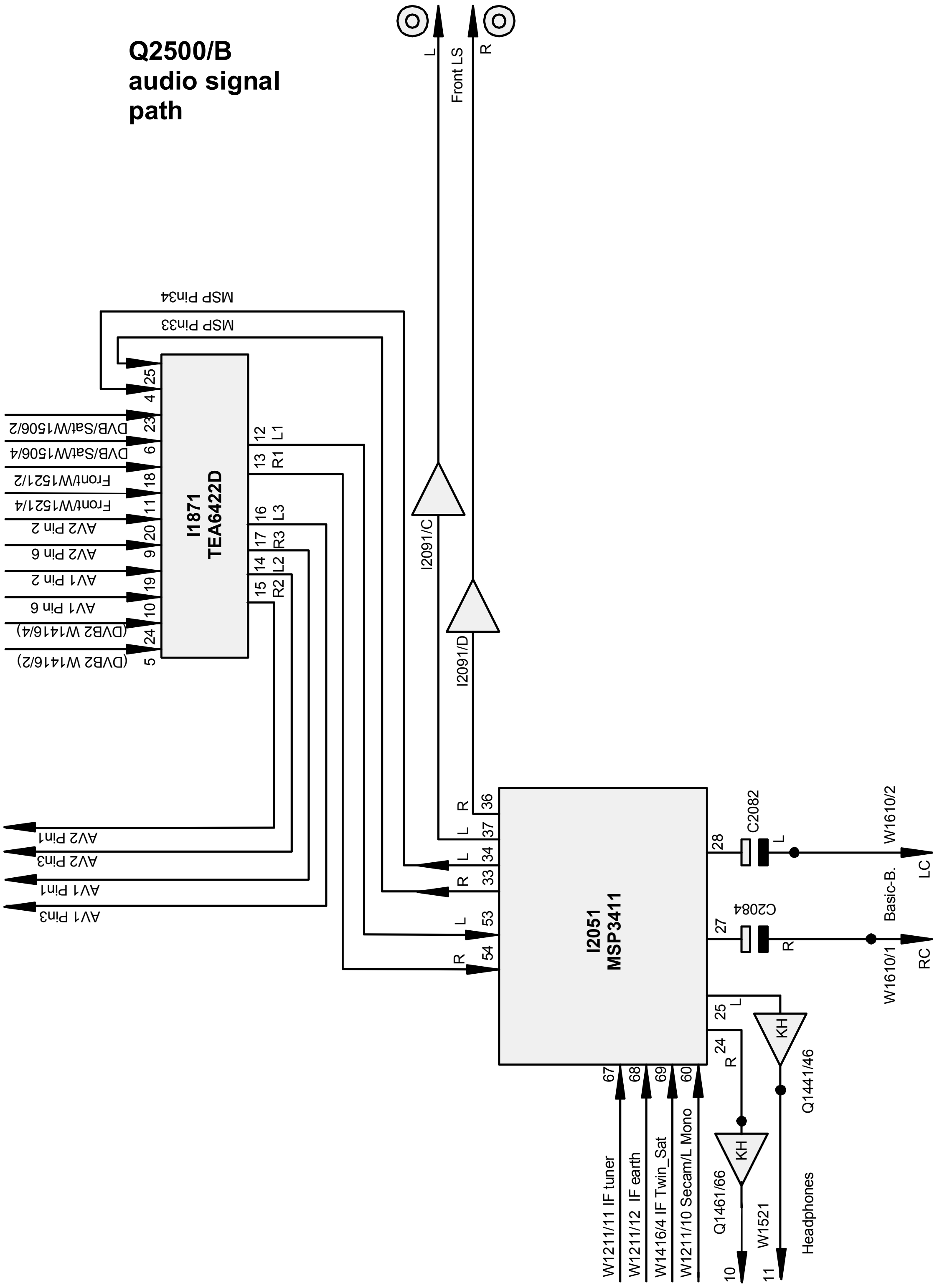
Dependent on the measured values the picture width and, if necessary, the V amplitude are influenced by the E/W output. Delay of the control is about the duration of 10 lines. A lateral glitch at bright picture settings cannot be avoided but can be reduced to some extent.
Due to the varying load on the line output stage, the line flyback pulse is also affected. This means that beam current changes also influence the H phase. The correction information on pin 14 of TDA 9332 opposes this via the internal phase correction.

5 Audio signal processing

5.1 Audio-Signal path
Block diagram Q 2500 H/M and B


Q2500/H/M
audio signal
path
Front LS
L
R
W2091/5
W2091/4
W2091/12
W2091/14
W2091/11
W2091/10
SPDIF in
DVB int.
W1251/2
DVB-int.
SPDIF out
SPDIF in1
SPDIF in2
AC3 module
W2091/8
W2091/3
W2091/2
W2091/1
C
LS
RS
LFE
C2074
I2091/B
AV3 Pin3
AV3 Pin1
MSP Pin34
MSP Pin33
C2092
C2091
I2091/C
I2091/D
I1871
TEA6422D
DVB/SatW1506/2
DVB/SatW1506/4
Front/W1521/2
Front/W1521/4
AV2 Pin 2
AV2 Pin 6
AV1 Pin 2
AV1 Pin 6
(DVB2 W1416/4)
(DVB2 W1416/2)
W2071/6
W2071/8
W2071/8
LC W2091/6
RC W2091/7
I2S-WS
I2S - DA out1
I2S - DA in1
# Not equipped with AC3
I1851
TEA6420D
AV3 Pin6
AV3 Pin2
AV2 Pin3
AV2 Pin1
AV1 Pin3
AV1 Pin1
I2051
MSP3411
C2082
C2084
W1610/2
Basic-B.
W1610/1
LC
RC
Q1441/46
KH
H-Link
W1541
Q1461/66
W1521
W1421/4 / TVO
W1421/2 / TVO
W1411/3 / Audio anlog
W1411/1 / Audio anlog
W1211/11 IF tuner
W1211/12 IF earth
W1416/4 IF Twin_Sat
W1211/10 Secam/L Mono
Headphones
W1431/HF transmitter

Q2500/B audio signal path


Front LS
L
R
I2091/C
I2091/D
MSP Pin34
MSP Pin33
I1871
TEA6422D
25
4
23
6
18
11
20
9
19
10
24
5
DVB/SatW1506/2
DVB/SatW1506/4
Front/W1521/2
Front/W1521/4
AV2 Pin 2
AV2 Pin 6
AV1 Pin 2
AV1 Pin 6
(DVB2 W1416/4)
(DVB2 W1416/2)
12 L1
13 R1
16 L3
17 R3
14 L2
15 R2
AV2 Pin1
AV2 Pin3
AV1 Pin1
AV1 Pin3
I2051
MSP3411
36 R
37 L
34 L
33 R
53 L
54 R
28
27
25 L
24 R
67
68
69
60
C2082
C2084
L
R
W1610/2
Basic-B.
W1610/1
LC
RC
KH
KH
Q1441/46
Q1461/66
W1521
Headphones
10
11
W1211/11 IF tuner
W1211/12 IF earth
W1416/4 IF Twin_Sat
W1211/10 Secam/L Mono

In the Q 2500 chassis a family of multi-standard sound processors is used, which contain all the modules for digital sound/IF-processing, FM/Nicam signal demodulation, Nicam decoding and audio base band. The multi-standard MSP 3411 sound processor is manufactured in 1.0 µm CMOS technology and incorporated into the Q 2500 chassis in a 80 pin PLCC housing.

For devices without NICAM an MSP 3400 or 3401 is used, which cannot process these NICAM signals. The MSP 3401 and MSP 3411 also support virtual surround. Otherwise there is no difference between these three types.

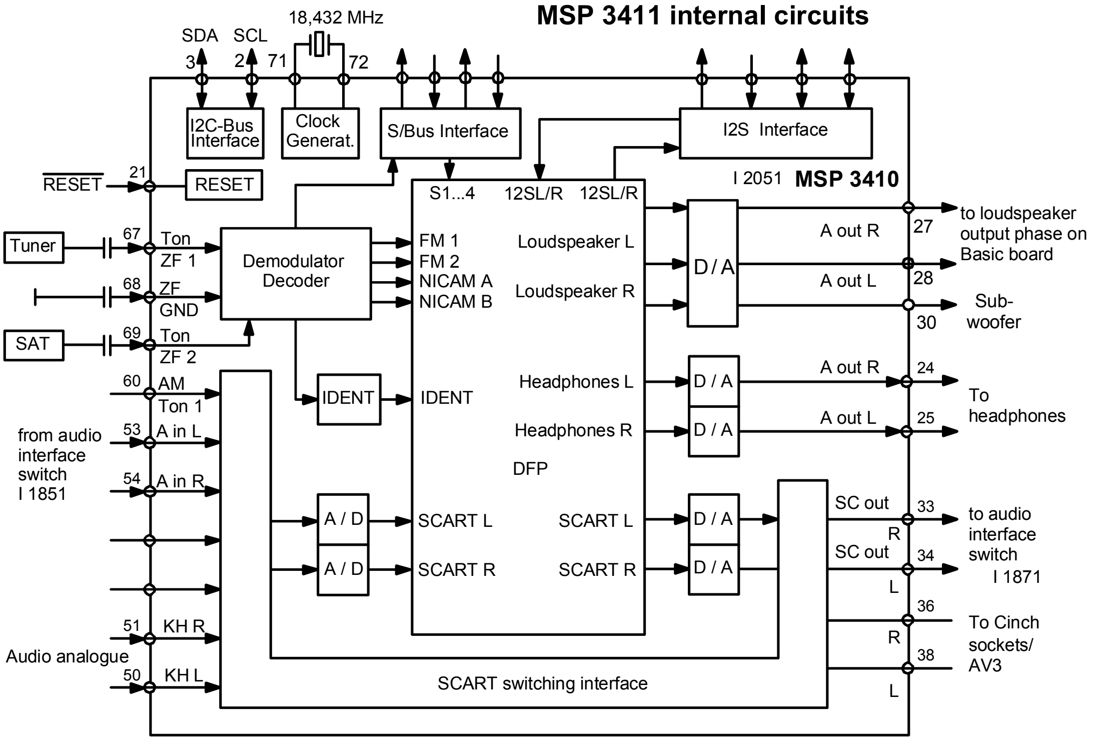
The multi-standard sound processor can be roughly divided into a demodulator-decoder-block and into an area that is responsible for the digital audio base band processing - DFP.

The following functions are integrated into the two blocks.

5.2 Demodulator/Decoder-Block

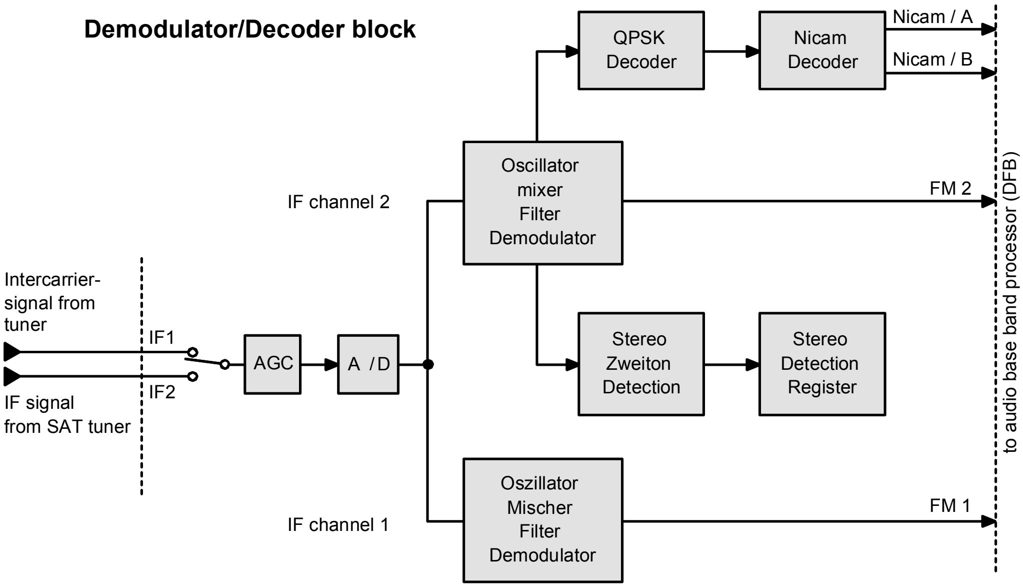
- Two selectable inputs for the sound/IF signal
- Automatic amplification control (AGC) for the selected sound/IF signal
- A/D converter for the sound/IF signal
- Two internal sound/IF channels, e.g. for stereo with sound carrier 5.5 MHz /5.74 MHz
- FM demodulation
- Decoder for Nicam signals

MSP 3411 internal circuits


18,432 MHz
SDA
SCL
3
2
71
72
I2C-Bus Interface
Clock Generat.
S/Bus Interface
I2S Interface
I 2051
MSP 3410
RESET
21
RESET
S1...4
12SL/R
12SL/R
Tuner
67
Ton
ZF 1
68
ZF
GND
SAT
69
Ton
ZF 2
Demodulator Decoder
FM 1
FM 2
NICAM A
NICAM B
Loudspeaker L
Loudspeaker R
D / A
A out R
A out L
27
28
30
to loudspeaker output phase on Basic board
Sub-woofer
60
AM
Ton 1
IDENT
IDENT
Headphones L
Headphones R
D / A
D / A
A out R
A out L
24
25
To headphones
from audio interface switch I 1851
53
A in L
54
A in R
DFP
A / D
A / D
SCART L
SCART R
SCART L
SCART R
D / A
D / A
SC out R
SC out L
33
34
to audio interface switch I 1871
36
R
38
L
To Cinch sockets/ AV3
51
KH R
Audio analogue
50
KH L
SCART switching interface

5.2.1 Audio baseband processing

- Flexible selection of the sound source to be processed, e.g. demodulator or Scart socket
- Selectable de-emphasis
- Stereo matrix
- Pre-amplifier for Nicam/FM and Scart signal
- Independent volume adjustment for loudspeaker and headphones
- Adjustment of bass, level, loudness, stereoscopic sound and balance in the loudspeaker branch and virtual surround


Demodulator/Decoder block
QPSK Decoder
Nicam Decoder
Nicam / A
Nicam / B
Oscillator mixer Filter Demodulator
IF channel 2
FM 2
to audio base band processor (DFB)
Intercarrier-signal from tuner
IF1
IF2
IF signal from SAT tuner
AGC
A / D
Stereo Zweiton Detection
Stereo Detection Register
Oszillator Mischer Filter Demodulator
IF channel 1
FM 1

5.2.2 Demodulator/decoder block

The sound/IF inter-carrier signal output by the tuner passes via a band-pass consisting of L/C 2032, R/C 2033 and C 2036, to the sound/IF input1, pin 67 of MSP 3411. The band-pass suppresses frequency components below 4.5 MHz and above 10 MHz. In this way sound interference that could be caused by the colour carrier or the neighbouring picture carrier is prevented. If the Twin-SAT unit is used a SAT sound/IF reaches the sound/IF input2 on pin 69 of MSP via pin connector W 1416 /pin 4 and the band-pass, consisting of L/C 2037, R/C 2038 and C 2009.

The analogue sound/IF signal is passed internally from pin 67 (Hyperband tuner) or 69 (SAT unit) to a transfer switch that is able to switch between the two IF inputs of the MSP under software control. The analogue IF signal is then adapted optimally by an automatic amplifier control, which can control input signals from 0.14 to 3 Vss, to the ADC. The ADC changes the sound/IF signal into an 8-bit data stream. The sampling rate is 18.432 MHz.

This is produced by the internal clock generator. The frequency determining 18.432 MHz quartz is connected to pins 71/72 of MSP 3411. This 18.432 MHz clock is also used for all digital processes in the MSP.

The digital sound/IF signal is now processed in a multi-standard sound processor by two independently operating sound/IF channels. This is necessary, for example, in order to process stereo transmissions with carrier frequencies of 5.5 /5.74 MHz or even other sound transmission standards. These two IF channels can be programmed by the operating software to different sound carrier frequencies. For the digitally filtered sound/IF carrier full modulation is carried out in both channels. The digital sound signals are felt on the output of the demodulator/decoder block.

In the second sound/IF channel decoding of the pilot sound carrier takes place with sound transmission by the two carrier frequencies 5.5 /5.74 MHz. In addition to the FM modulated VF signal, the 5.74 MHz carrier is modulated with an AM modulated 54,7 kHz pilot sound carrier. The pilot sound carrier is variously modulated depending on the transmitted VF signals (mono, stereo or two-tone).

Modulation type from pilot sound carrier

Operating type	Natural frequency
Mono	unmodulated
Stereo	117.5 Hz
Two tone	274.1 Hz

Detection of the pilot sound carrier is carried out in the second IF channel, in which the 5.74 MHz sound carrier processing takes place, The result of the continuous pilot sound carrier evaluation is written to the "Stereo Detection Register" of the MSP. This register is read cyclically by the CCU via the I²C bus, and depending on the operating mode set the CCU communicates to the MSP via the I²C bus the type of de-matricising that must be switched on.

5.2.3 Nicam processing

Nicam is a sound transmission system designed for terrestrial transmission. It was developed in the United Kingdom for stereo TV transmission and is now used in a number of other European countries.

The name "Nicam" is an abbreviation and stands for "Near instantaneously compounded audio multiplex".

In this system the digital audio information is modulated by an additional sound carrier.

The signal gets its name QPSK signal from "Quadrature phase shift keying" from the type of modulation, which is quadrature modulation with rotating phase,

Owing to the various television standards two different sound carrier frequencies are used for the Nicam transmission. For PAL-I the sound carrier is 6.552 MHz and for PAL-B/G it is 5.85 MHz.

5.2.4 Audio signals from the interface switching

If audio signals are fed to the Scart sockets, the selected VF signal pair is applied directly to pins 53/54 of the multi-standard sound processor via the audio interface switch (see Audio Signal Path). If the signal board is fitted with 3 AV sockets the audio signal is output by the AV3 socket directly to pins 56/57 of the MSP. The audio signal passes via an internal switch to two ADCs. The audio signal is digitised by the two ADCs for further processing and then led internally to the audio base band processor.

5.2.5 AM audio signals at L standard

If AM signals are processed in the device, the IF preparation and demodulation is carried out in the HF/IF block.
The VF signal comes from pin 23 of the cable tuner to pin 60 of the MSP 3411. Furthermore, the signal path is the same as the signals that come from the interface transfer to pins 53, 54 of the MSP.

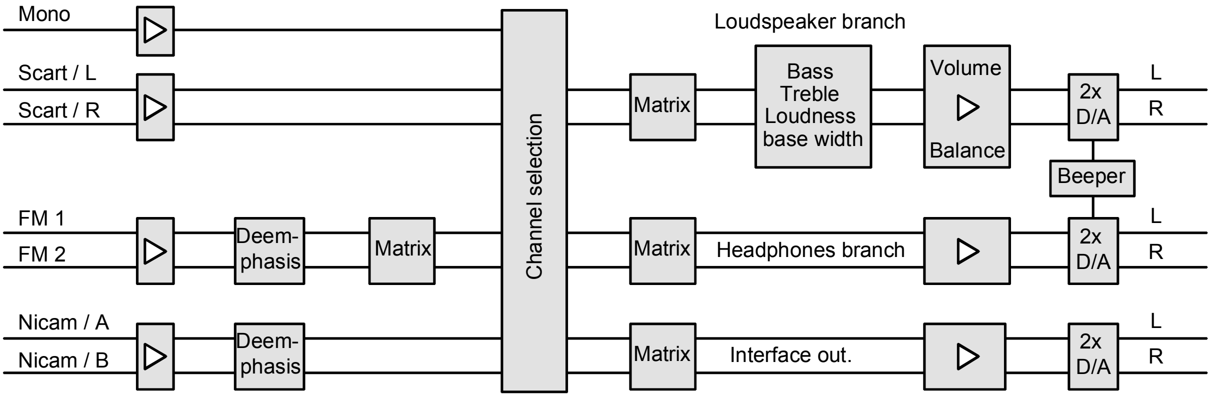
5.2.6 Audio base band processor

In the DFP there is a pre-amplifier for all three digital VF signal pairs; Nicam A/B, FM 1/2 and Scart L/R. The adjustment of the pre-amplifier for each VF input pair is independent and is determined by the software. This means that for further processing nearly the same digital VF level is available.

For the FM 1/2 and Nicam A/B signal pairs the pre-amplifier is followed by the necessary de-emphasis. The FM 1/2 VF signal pair is fed onward to the FM matrix. For an FM stereo transmission the stereo L and R signals are re-constituted from the L+R/2 signal of FM 1 and the R signal of FM 2 in the FM matrix.

The FM matrix is controlled by SDA 6000 via the I²C bus according to the selected operating mode - stereo or mono. In the following channel selection, after the selected operating mode, the selected VF signal is switched to the VF output branches in the MSP, which are controlled independently of one another, for loudspeaker, headphones and interface selection.

Audio Base Processor (DFP)


Mono
Scart / L
Scart / R
FM 1
FM 2
Nicam / A
Nicam / B
Deem-phasis
Deem-phasis
Matrix
Channel selection
Matrix
Matrix
Matrix
Loudspeaker branch
Bass
Treble
Loudness
base width
Volume
Balance
Headphones branch
Interface out.
Beeper
2x D/A
2x D/A
2x D/A
L
R
L
R
L
R

5.2.7 Loudspeaker branch

After channel selection the two VF channels are led to the digital filter and control stages, which are all controlled from the CCU via the I²C bus. As the processing for both channels is identical, the following description will deal with one channel only.

5.2.8 Loudness

The signal comes from the matrix and is fed initially to a filter with which an ‘as heard’ loudspeaker control (Loudness) is implemented. Depending on the loudspeaker setting frequencies around 1 kHz are reduced, as for same sound pressure the human ear senses these frequencies as being a lot louder than deeper or higher frequencies. The filter coefficient necessary for the reduction is determined and is applied in varying strengths to the signal, depending on the volume.

5.2.9 Sound setting

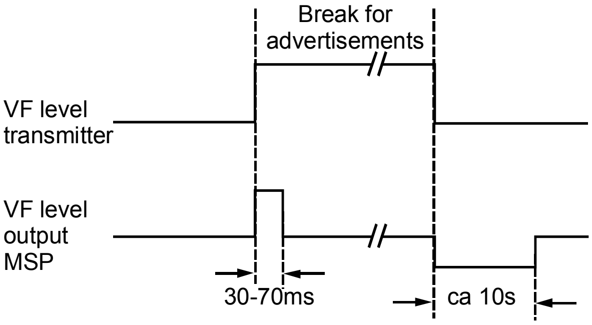
The sound control stage consists of two separate filters for the height and bass settings. The control range for the two filters is ±12 dB.

5.2.10 Loudspeaker control and AVC (Automatic Volume Control)

The signal then passes through the loudspeaker control stage. The control range comprises 64 stages. In MSP 3411 each channel has a second control stage for the balance setting.

In addition, the MSP offers the facility of measuring the level at the input. This is used as the AVC function. This means that it is possible to select different volumes for transmitters during breaks for advertisements or between different transmitters. Therefore, the design does not provide for a programme location related volume correction.

The actual value on the input determined by the MSP is communicated to SDA 6000 via the I^2C bus. In the operating software a precisely defined amplification is assigned via the volume value. If the measured value deviates from the required value, the volume is decreased or increased via the I^2C bus until the required value is reached.



This means that various control constants are used. Loud passages are toned down within 30 to 70 ms. An increase in soft passages on the other hand occurs with a delay of about 10 s, to avoid an unwanted increase in volume during the transmission. In addition, the AVC can be switched off within the sound menu.

5.2.11 DAC

A DAC is controlled with the signal set by the digital controller. The analogue signal is output for the right and left channels on pin 27/28. The signal is then fed via transistors Q 2081 and Q 2083, which are switched as an impedance converter. Via the coupling capacitors C 2082/84 the signal then arrives at W 1610, pins 1 and 2, and from there is fed to the basic board on the two output stages.

5.2.12 Headphone branch

In the headphone branch there is an independent volume setting, that can be changed independently of the loudspeaker volume, also in 64 stages.

The digital/analogue converted audio signals for the headphones are output to pins 24/25.
The W 1494 audio Cinch sockets are supplied with level by pins 36/37 of the MSP. In order to deliver sufficient output level to these Cinch sockets the Q 2500 chassis has in this branch two amplifier stages, consisting of the operational amplifier I 2091C and D. The amplifiers amplify the signal by a factor of 2. For the setting “Sound via HiFi unit“ the output level can be set from 0 Vss to 3.5 Vss.
If “Sound via TV“ is set, then there is a standard level on the Cinch sockets.

5.2.13 Interface branch

The audio level for the interface is set by the operating software and cannot be changed. The digital, analogue-converted VF signals for the interface connection are applied to pins 33/34.

5.2.14 Deadline volume

During operation, a kind of awakening function can be programmed into the Q 2500 chassis as a deadline time. In addition, there is an awakening tone, with an adjustable volume.

Via the I^2C bus it is also possible for MSP 3411 to switch off the sound in the loudspeaker and headphone branch. At the same time an internally generated 1 kHz rectangular signal is applied to these channels. In the headphone branch the level is dependent on the headphone volume. In the loudspeaker branch the level can be set, independently of other volume, in 39 stages in the “Time services“ menu .

5.2.15 Mute circuit

As the only additional switching measure there is an active mute circuit parallel to the output amplifier inputs with transistors Q 1581 and Q 1586. It is controlled by transistors Q 2966 and Q 2961 from the ON/OFF command of the CCU, or via transistor Q 2027 from pin 77 of MSP 3410 .
Noise associated with switching on and off, as well as any crackling when switching over is suppressed.

Mute stages are also incorporated for the headphone branch and the Cinch sockets. If an AC3 module is incorporated it also generates a mute if necessary e.g. if the sound decoder is switched.

On start up the L level of the ON information of the CCU of transistor Q 2961 is blocked. The voltage taken from the conversion transformer and rectified by D 491 is able to charge Elko´s C 2967/68 very quickly via diode D 381. The charge process from C 2963 flows via R 2963 extremely slowly, as D 2964 is now blocked. Not until Elko C 2963 is charged to almost the same potential as C 2967/68 does transistor Q 2966 conduct. A positive voltage is felt on the base of transistors Q 1581/Q 1586 whereby this switches and the VF lines are at earth potential.

Not until C 2963 is charged and Q 2966, Q 1581 and Q 1586 are blocked, can the VF reach the output stage without hindrance.

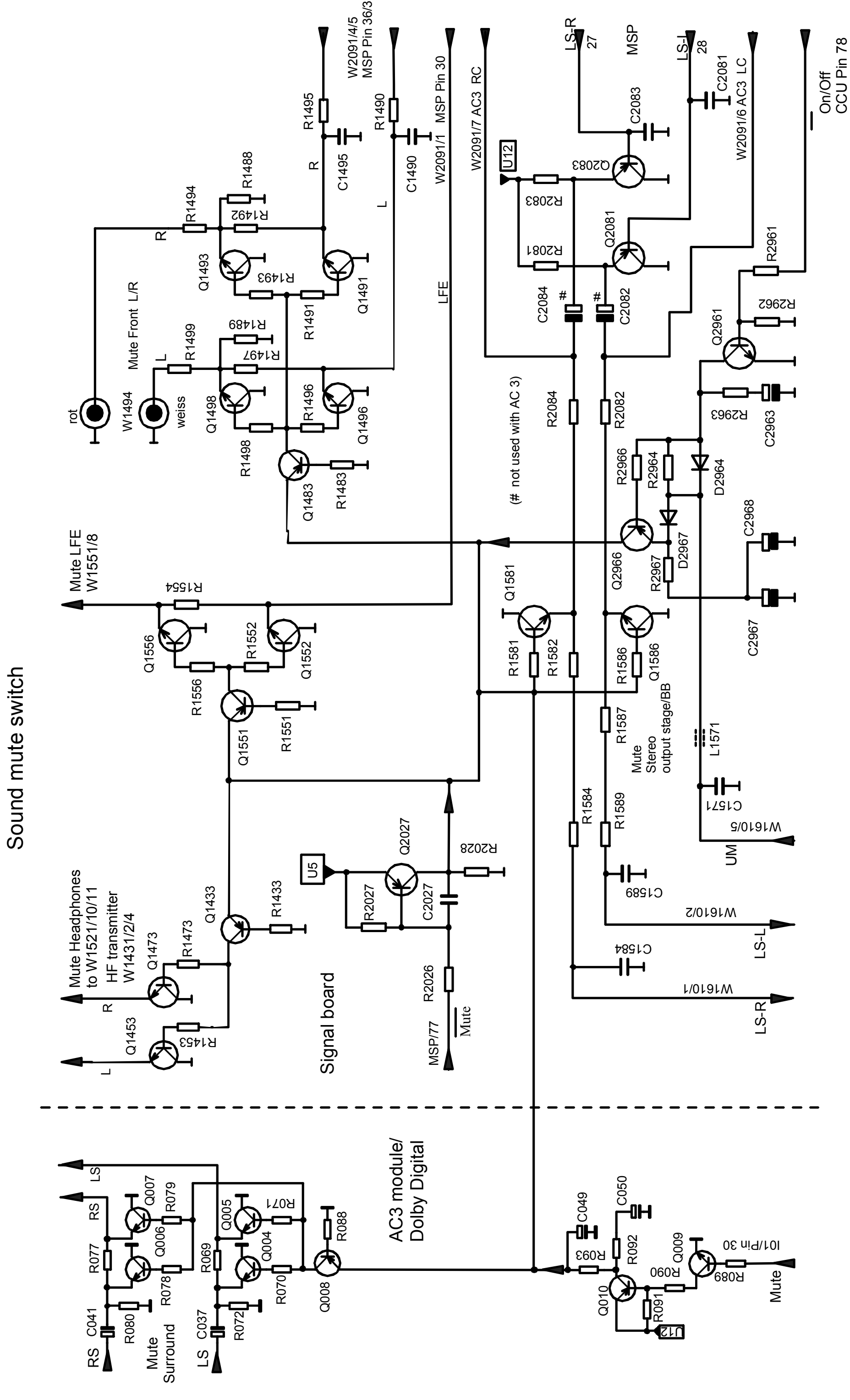
At the point of switching off the voltage from the power supply falls off relatively quickly. Transistor Q 2961 is switched by the H level of the OFF information of the CCU . This means the charge from C 2963 can flow to earth. Q 2966 becomes conductive, whereby the charge from C 2967/68 controls transistors Q 1581 and Q 1586 and the VF lines are at earth potential.

The mute information that is active on start up and shut down activates all the mute levels.

In the initialisation phase pin 77 is set to L level by MSP 3411. With L level transistor Q 2027 switches. Via its emitter-collector path U5 also reaches the mute line and all mute stages are active.
To prevent the VF mute stages themselves producing interference during the switching phase, they are d.c. decoupled and fitted with discharge resistors.

If a Dolby Digital Module is incorporated the LFE channel from the mute function is controlled silently via transistors Q 1551 and Q 1552/56.

The Dolby Digital Module receives the mute function from the signal board on contact connector W 2091 /pin 13.


Sound mute switch
Signal board
AC3 module/
Dolby Digital
Mute Headphones
to W1521/10/11
HF transmitter
W1431/2/4
Mute LFE
W1551/8
Mute Front L/R
rot
W1494
weiss
W2091/4/5
MSP Pin 36/37
W2091/1 MSP Pin 30
W2091/7 AC3 RC
LS-R
27
MSP
LS-L
28
C2081
W2091/6 AC3 LC
On/Off
CCU Pin 78
LFE
(# not used with AC 3)
Mute
Stereo
output stage/BB
W1610/5
UM
W1610/2
LS-L
W1610/1
LS-R
MSP/77
Mute
U5
U12
Mute Surround
RS
LS
I01/Pin 30
Mute
R1495
C1495
R1490
C1490
R1494
R1488
R1492
R1493
R1491
Q1493
Q1491
R1499
R1489
R1497
R1496
R1498
Q1498
Q1496
Q1483
R1483
R1554
Q1556
R1556
R1552
Q1552
Q1551
R1551
Q1433
R1433
Q1473
R1473
Q1453
R1453
Q2027
R2027
C2027
R2028
R2026
R2083
Q2083
C2083
R2081
Q2081
C2084
C2082
R2084
R2082
Q1581
R1581
R1582
Q1586
R1586
R1587
R1584
R1589
C1589
C1584
C1571
L1571
Q2966
R2966
R2964
D2964
R2967
D2967
C2968
C2967
Q2961
R2961
R2962
R2963
C2963
Q007
R079
Q006
R077
R078
R080
C041
Q005
R071
Q004
R069
R070
R072
C037
Q008
R088
C049
C050
R093
R092
Q009
R090
R089
Q010
R091

On the Dolby Digital Module the two surround channels are muted via transistors Q 8/Q 4/5 and Q 6/7. If a data error is detected on the Dolby Digital Module during digital sound signal processing, pin 30 on I 01 outputs H level. Via the two transistors Q 9 and Q 10 the mute function is then activated. For the mute function the Dolby Digital Module represents both input and output.
As you can see from the mute circuit, some sounds have an output line, as, for example, for the LFE channel Q1552/56, two transistors are used. This measure improves the mute behaviour and the error rate of these stages.

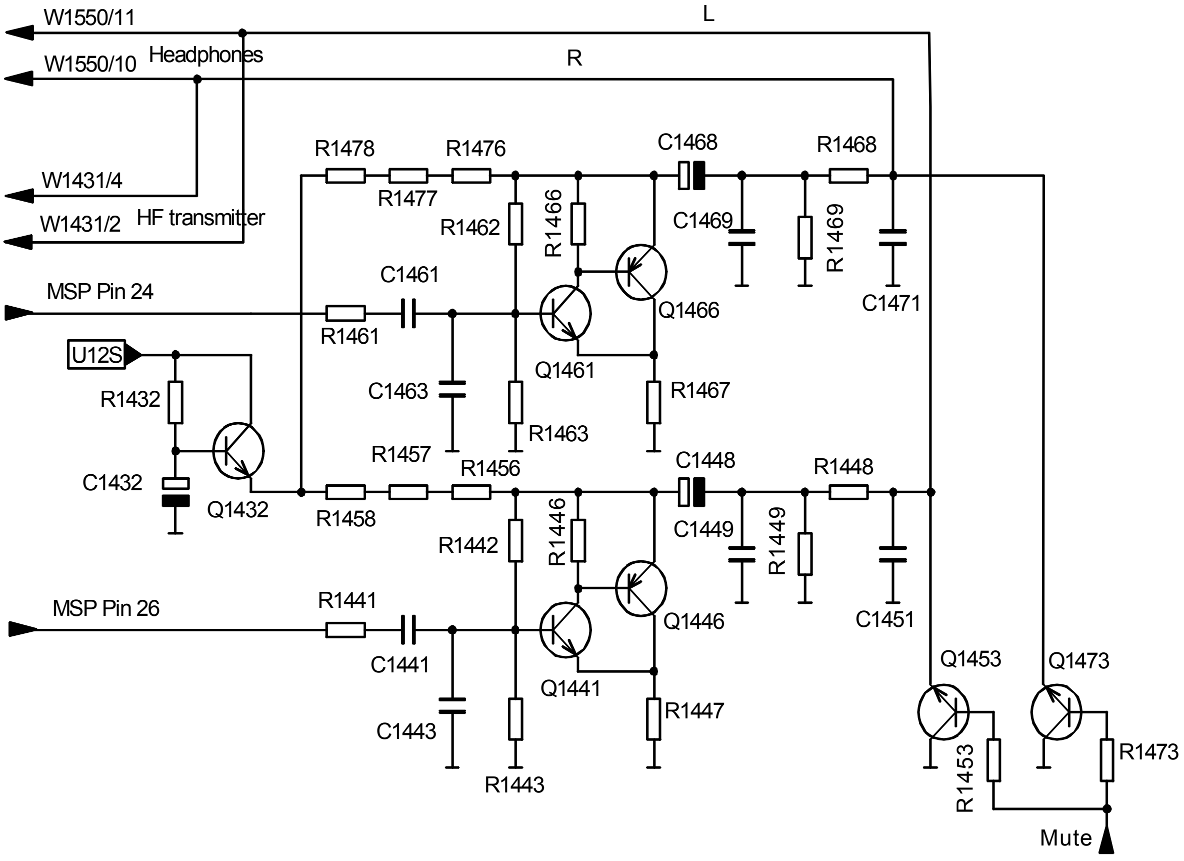
5.2.16 Headphone amplifier

As in previous models the front panel of the device has a connector for headphones. As for the loudspeaker branch the signals are also generated in the MSP 3411. As already described, the loudspeaker control for the headphone control is also implemented in it.

These signals are output in pulse width modulated form on pins 24 and 26 of the MSP and integrated with external RC components into an VF signal at up to 1.2 Vss. They are fed respectively to an amplifier stage, consisting of 2 transistors Q 1441/46 and Q 1461/66. This stage amplifies them to 9 Vss and outputs them via a decoupling through C 1448/68 to the headphones socket and pin 2/4 on pin connector W 1431 for the HF transmitter.

The headphones volume can be controlled in 63 stages and the setting displayed on the screen.

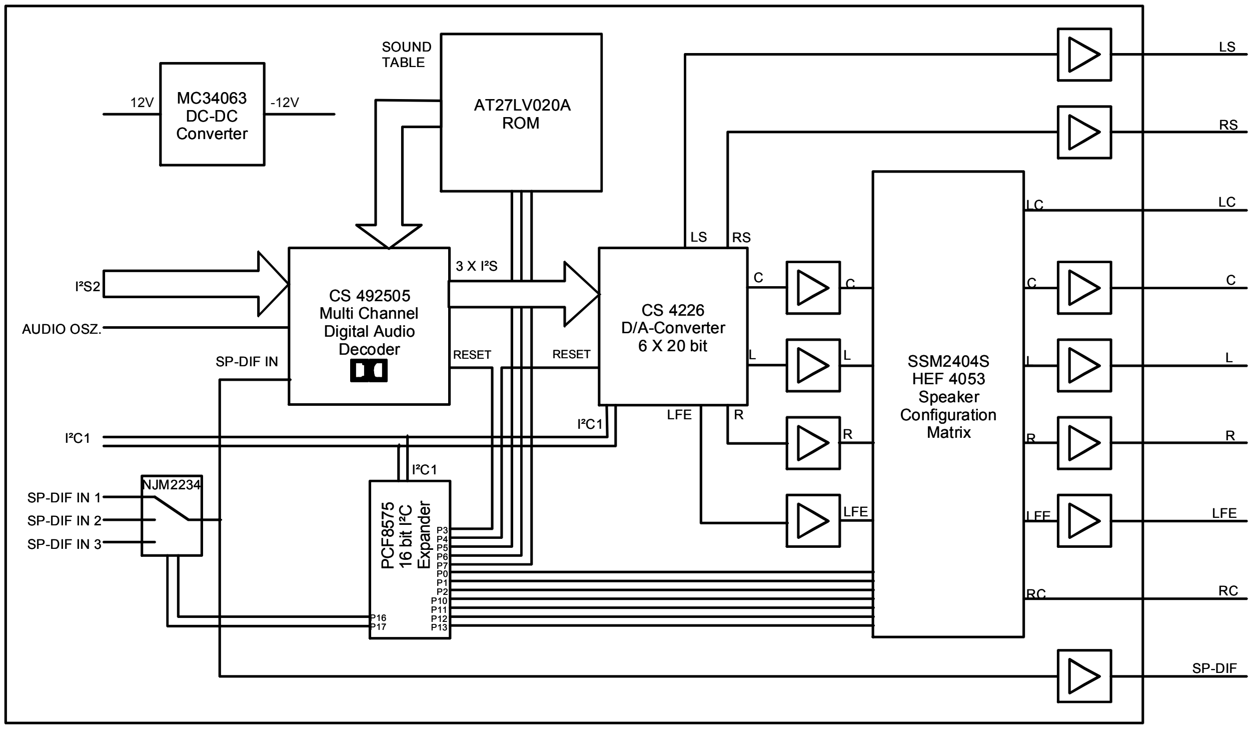
Headphones amplifier


W1550/11
L
W1550/10
Headphones
R
W1431/4
W1431/2
HF transmitter
MSP Pin 24
U12S
R1432
C1432
Q1432
MSP Pin 26
R1478
R1477
R1476
R1462
R1466
C1468
C1469
R1469
R1468
C1471
C1461
R1461
C1463
Q1461
R1463
Q1466
R1467
R1457
R1458
R1456
R1442
R1446
C1448
C1449
R1449
R1448
C1451
R1441
C1441
C1443
Q1441
R1443
Q1446
R1447
Q1453
Q1473
R1453
R1473
Mute

5.3 AC3 module (Dolby Digital)

5.3.1 Block diagram, AC3 module

AC3 modul


SOUND
TABLE
AT27LV020A
ROM
12V
MC34063
DC-DC
Converter
-12V
I²S2
AUDIO OSZ.
CS 492505
Multi Channel
Digital Audio
Decoder
SP-DIF IN
3 X I²S
RESET
RESET
CS 4226
D/A-Converter
6 X 20 bit
LS
RS
C
L
R
LFE
I²C1
I²C1
I²C1
NJM2234
SP-DIF IN 1
SP-DIF IN 2
SP-DIF IN 3
PCF8575
16 bit I²C
Expander
P3
P4
P5
P6
P7
P0
P1
P2
P10
P11
P12
P13
P16
P17
SSM2404S
HEF 4053
Speaker
Configuration
Matrix
LC
C
L
R
LFE
RC
LS
RS
LC
C
L
R
LFE
RC
SP-DIF

5.3.2 AC 3 signal processing

A Dolby Digital Module can also be incorporated into the signal board variants Q 2500/H and Q 2500/M. If a signal board is fitted with the AC 3 module, the essential sound signal processing takes place on the AC 3 module. The AC 3 module supports:

- Dolby Pro Logic
- Dolby Digital 5.1
- Circle Surround
- PCM Stereo

Dolby Digital 5.1 and Circle Surround can supply up to 6 sound channels.

- 2 channels for Front left and right
- 2 channels for Surround left and right
- 1 Centre channel
- 1 deep sound channel (LFE low frequency effects)

The Dolby Digital 5.1 Decoder is only active, when a correct AC 3 audio digital signal is supplied from a signal source.

The Circle Surround Decoder operates with a normal stereo signal. From this stereo signal the decoder decodes the 6 sound channels. This function has the advantage that for the great majority of stereo transmitters a 5.1 surround signal can already be used.

Dolby Pro Logic supports four sound channels.

2 channels for front left and right

1 centre channel

1 mono surround channel

Dolby Pro Logic also operates with a stereo signal, this must, however, also be coded with the Dolby Pro Logic standard. If this is not the case then no Center/Surround Signal is produced.

NF bandwidth of the sound channels

	Dolby Pro Logic	Dolby Digital 5.1	Circle Surround
2 channels Front L/R	20Hz-20KHz	20Hz-20KHz	20Hz-20KHz
2 channels Surround	no	20Hz-20KHz	20Hz-20KHz
Mono Surround	100-7kHz	no	no
Center	20Hz-7KHz	20Hz-20KHz	20Hz-20KHz
Deepsound-channel LFE	no	20Hz-100Hz	20Hz-100Hz

The AC 3 modules can receive digital audio signals via three paths.

- I^{2}S bus data supplied from MSP 341x on the signal board.
- SPDIF audio data from the two digital Audio Cinch input sockets.
- SPDIF audio data form the internal DVBi 2 Decoder (deliverable end 2002, not used in all device variants).

The AC 3 module cannot process any analogue sound signals directly. The analogue sound signals from internal – e.g. Sat unit, tuner or DB module – as also from external – e.g. video recorder – sound signal sources, must first be converted into digital sound bus data (I^{2}S bus). This task is implemented by the Multi Sound Processor MSP 341x, which is incorporated into the signal board.
The digital I^{2}S bus data is emitted by MSP I 2051 on pins 4/5 and 6 and are fed to the AC 3 module via pins 5/6/7 of contact connector W 2071. All analogue sound output signals to the AV sockets and the headphones amplifier are delivered by the MSP. The AC 3 module has no influence on these output signals. The AC 3 module does not deliver any I^{2}S bus data back to the MSP. This also means that no sound signals are delivered to the AV sockets and the headphones amplifier, if signals are supplied only via the SPDIF Cinch sockets.

The SPDIF signals (SPDIF **S**ony **P**hilips **D**igital **I**nter**F**ace, level 0.7 Vss-1 Vss to 75 Ohm) are supplied by the Cinch sockets to the contact strip W 2091 pin 14 SPDIF in1 and pin 11 SPDIF in2.
SPDIF data from DVBi 2 module is supplied to W 2091 pin 10.
The SPDIF signals reach the AC 3 module on changeover switch I 18. This is controlled by the I^{2}C bus expander I 11 via pin 2/4. The SPDIF signal selected for processing is output to pin 7 of I 18. The selected signal is also returned to the SPDIF Cinch outputs via pin 12 of Q 11 and W 301.
I 2 converts the SPDIF signal – input pin 42 – of the I^{2}S bus data – I 2 pins 1/43/44 - from MSP in the I^{2}S bus data for the I 1 (DSP - Digital Sound Processor). I 1 processes this audio data according to the prescribed standard. For this the respective software required is loaded from I 5 memory. The memory is organised into 8 blocks, each of 32 kByte. For Circle Surround, Doby Pro Logic and Dolby Digital a 32 kByte block respectively is required. If, for example, Circle Surround is switched to Dolby Surround, the CCU controls Expander I 11 via the I^{2}C bus in such a way that the address switching lines I 11 pin 9/10/11 of the memory block in I 5 for Dolby Surround can be selected. DSP I 1 receives an interrupt from CCU pin 77 via pin 14 of W 321.

The interrupt causes I 2 to load new software from the memory. Due to the block preselection from the the I2C bus expander, the DSP now loads the software for Dolby Pro Logic.
The DSP processes the I^{2}S bus data according to the appropriate instructions. The overwhelming number of sound parameters to be set also occur in the DSP.
The DSP feeds the digital sound bus data back to the converter I 2, where the digital/analogue conversion takes place. The 6 sound output channels of I 2 reach W 301 via the operational amplifier and the loudspeaker matrix – consisting of I 6/9/14.

- pin 1 LFE/SUB (deep sound channel)
- pin 2 RS (Surround right)
- pin 3 LS (Surround left)
- pin 4 R (Front right)
- pin 5 L (Front left)
- pin 6 LC (Center left)
- pin 7 RC (Center right)
- pin 8 C (Center channel)

5.3.3 AC 3 IC functions

CS 4925-01 (I 1)
Multi Channel Digital Audio Decoder.

- Processes according to the operating mode, - Circle Surround, Dolby Pro Logic Dolby, Digital 5.1 - digital Sound-bus-data.

- Implements all sound settings, such as height and depth settings.

CS 4226 (I 2)
DAC

- Converts SPDIF signals into I^{2}S bus data for I 1 .

- Converts the I^{2}S bus data processed by I 1 into analogue signals for the loudspeaker matrix.

6 Interface switching

Interface switching is via Q 2500 on the signal board. Switching of the various on and off signals is implemented essentially by six ICs; two TEA 6415, two CD 4053 for the video signals, a TEA 6422 and a TEA 6420 for the audio signal switching. Control is directly from I²C bus system 3 via SDA 6000. An exception is CD 4053 I 1631 and I 1771.

I 1631 switches between the RGB lines of the AV3 socket and the RGB signals of the DVB decoder. I 1631 is controlled from a free switch output in MSP, which itself is activated by the CCU via the I2C bus. If the output on pin 78 of the MSP is switched to H level, then L level is felt on pins 9/10/11 of I 1631 via inverter Q 1637. With L level on, its control input I1631 switches to AV3 operation, at H level the RGB signals from the DVB decoder are switched through to the signal processing.

I 1771 is used for chroma signal switching if a Digital Link Plus SVHS video recorder is connected.
During SVHS operation a chroma signal is expected from SVHS Digital Link Plus video recorders on pin 7 of the AV socket. For VHS video recorders it is pin 15.
If the device control detects a SVHS Digital Link Plus VCR, the chroma signal is switched to pin 7 of the AV1 or AV2 socket on overplay and during a DVB recording. I 1771 is switched from two switch outputs on pin 115/116 I 2311. This in turn is controlled by the CCU.

As the two TEA 6415 must be addressed differently for picture signal switching, pin 7 of I 1116 is earthed and I 1181 is at the operating voltage.

The exact signal flow for the video and audio signals can be obtained from the appropriate flow diagrams.